Form OGC-1a

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

SUBMIT TRIPLICATE*
(Other instructions on reverse side)

NOV 16 1987

DIVISION OF OIL, GAS & MINING

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. Type of Work
DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. Type of Well
Oil Well [X] Gas Well [ ] Other Single Zone [X] Multiple Zone [ ]

2. Name of Operator
Axem Resources Incorporated

3. Address of Operator
7800 E. Union Ave., Suite 1100, Denver, Colorado 80237

4. Location of Well (Report location clearly and in accordance with any State requirements.*)
At surface
467' FSL, 475' FEL SESE
At proposed prod. zone
Same

5. Lease Designation and Serial No.
Holmes - Fee

6. If Indian, Allottee or Tribe Name

7. Unit Agreement Name

8. Farm or Lease Name
Vernal

9. Well No.
16-1

10. Field and Pool, or Wildcat
Wildcat

11. Sec., T., R., M., or Blk. and Survey or Area
Sec 1, T5S-R21E

14. Distance in miles and direction from nearest town or post office*
1 mile north to Naples

12. County or Parrish
Uintah

13. State
Utah

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drlg. line, if any)
440'

16. No. of acres in lease
40

17. No. of acres assigned to this well
40

18. Distance from proposed location* to nearest well, drilling, completed, or applied for, on this lease, ft.
None

19. Proposed depth
7500'

20. Rotary or cable tools
Rotary

21. Elevations (Show whether DF, RT, GR, etc.)
GR 5,279'

22. Approx. date work will start*
November 23, 1987

23. PROPOSED CASING AND CEMENTING PROGRAM

Size of Hole	Size of Casing	Weight per Foot	Setting Depth	Quantity of Cement
12-1/4"	8-5/8"	24#	380'	to surface - 285 sxs
7-7/8"	5-1/2"	17#	7500'	200 sxs

AXEM RESOURCES INCORPORATED proposes to drill a 7500' Weber test.

Mud Program: Gel-lime to 380'. 8.8-9.1 Low solids, Non-Dispersed to T.D.

Testing & Logging: Will drill stem test any significant shows while drilling to T.D. Cores are anticipated in the Phosphoria and Weber Formations. A resistivity and porosity logs will be run after reaching T.D.

Formations:

Frontier	3,579'	Navajo	5,410'
Dakota	3,939'	Chinle	6,199'
Morrison	4,029'	Shinarump	6,499'
Curtis	4,879'	Moenkopi	6,459'
Entrada	5,069'	Phosphoria	7,189'
Carmel	5,299'	Weber	7,359'

TOTAL DEPTH 7,500'

BONDING: Will be sent under separate cover from North River Insurance Company.

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.
Signed Shari L. Janata BYP Title Senior Technician Date 11-13-87

(This space for Federal or State office use)

Permit No. Approval Date

Approved by Title Date

Conditions of approval, if any:

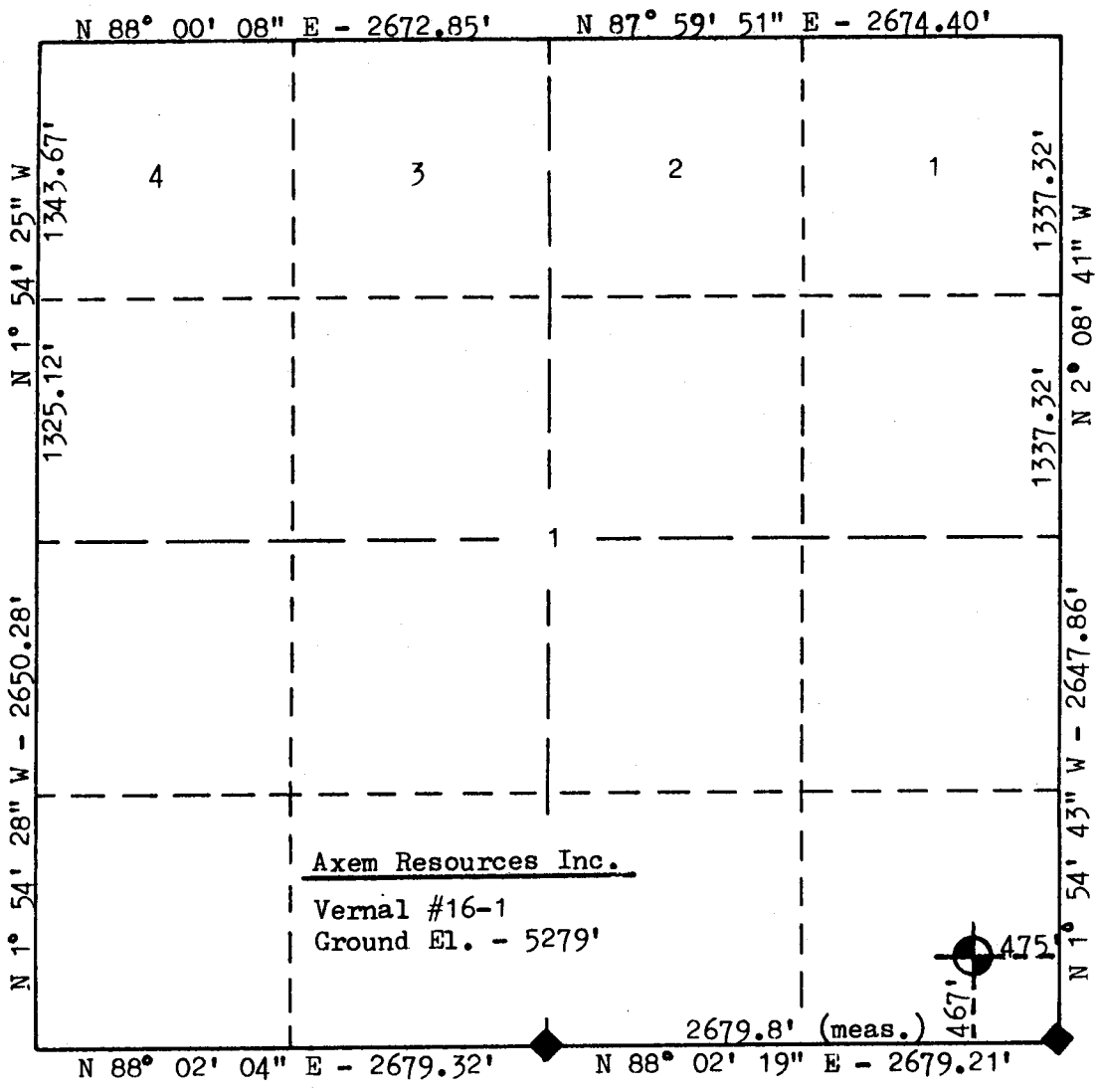
*See Instructions On Reverse Side

Form PS-102

POWERS E[illegible]ION,
P.O. Box 2612
Denver, CO 80201-2612
303-321-2217

All POWERS ELEVATION, INC. elevations originate from accepted U.S. Benchmarks.

R. 21 E.



Note: Bearings & distances shown are from the Uintah County Survey Control Plat unless otherwise noted.

500 0 500 1000 1500 2500
SCALE IN FEET

◆ - Indicates Uintah County survey cap found.

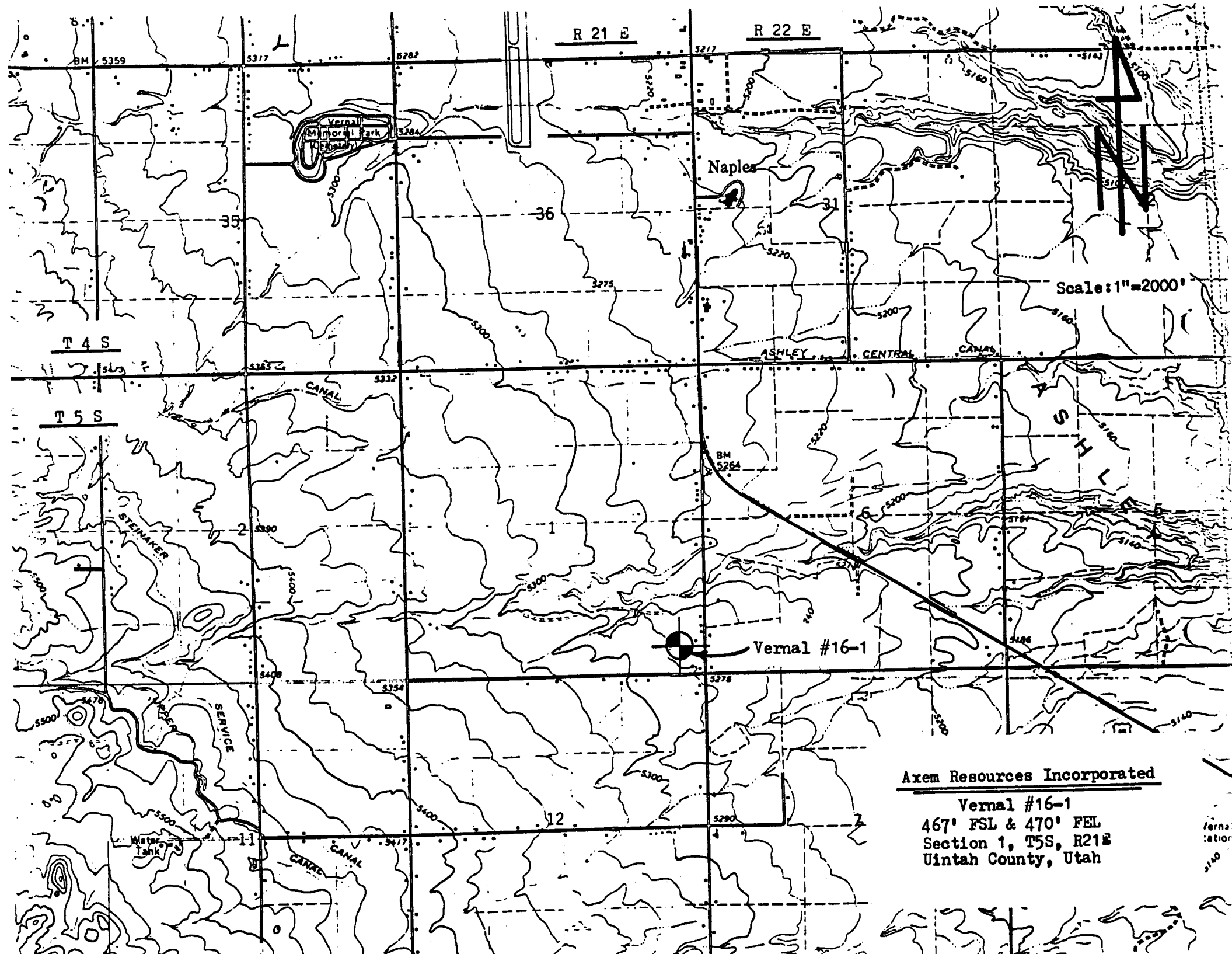
Powers Elevation, Inc. of Denver, Colorado has in accordance with a request from Neal Leafdale for Axem Resources Incorporated determined the location of Vernal #16-1 to be 467' FSL & 475' FEL Section 1, Township 5 South Range 21 East of the Salt Lake Meridian, Uintah County, Utah.

I hereby certify that this plat is an accurate representation of a correct survey showing the location of Vernal #16-1

Date: November 10, 1987

T Tolton

Licensed Land Surveyor No. 2711
State of Utah


R 21 E
R 22 E
T 4 S
T 5 S
Naples
Vernal Memorial Park
Water Tank
ASHLEY CENTRAL CANAL
CANAL
STEINAKER SERVICE
Vernal #16-1
Scale: 1"=2000'
Axem Resources Incorporated
Vernal #16-1
467' FSL & 470' FEL
Section 1, T5S, R21E
Uintah County, Utah

Form OGC-1a

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

RECEIVED
NOV 16 1987
DIVISION OF OIL, GAS & MINING

16

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

5. Lease Designation and Serial No.: Holmes - Fee

6. If Indian, Allottee or Tribe Name:

1a. Type of Work: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

7. Unit Agreement Name:

b. Type of Well: Oil Well [XX] Gas Well [ ] Other — Single Zone [XX] Multiple Zone [ ]

8. Farm or Lease Name: Vernal

2. Name of Operator: Axem Resources Incorporated (303) 740-9000

9. Well No.: 16-1

3. Address of Operator: 7800 E. Union Ave., Suite 1100, Denver, Colorado 80237

10. Field and Pool, or Wildcat: ✓Wildcat

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At surface: 467' FSL, 475' FEL SESE
At proposed prod. zone: Same

11. Sec., T., R., M., or Blk. and Survey or Area: Sec 1, T5S-R21E

14. Distance in miles and direction from nearest town or post office*: 1 mile north to Naples

12. County or Parrish: Uintah 13. State: Utah

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drlg. line, if any): 440'

16. No. of acres in lease: 40

17. No. of acres assigned to this well: 40

18. Distance from proposed location* to nearest well, drilling, completed, or applied for, on this lease, ft.: None

19. Proposed depth: 7500'

20. Rotary or cable tools: Rotary

21. Elevations (Show whether DF, RT, GR, etc.): GR 5,279'

22. Approx. date work will start*: November 23, 1987

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Size of Hole	Size of Casing	Weight per Foot	Setting Depth	Quantity of Cement
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Formations:

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24.

Signed: Shari L. Janata BYP — Title: Senior Technician — Date: 11-13-87

(This space for Federal or State office use)

Permit No. 43-047-31825 — Approval Date:

APPROVED BY THE STATE OF UTAH DIVISION OF OIL, GAS, AND MINING
DATE: 11-25-87
BY:
WELL SPACING: R615-3-2

Approved by: — Title: — Date:

Conditions of approval, if any:

*See Instructions On Reverse Side

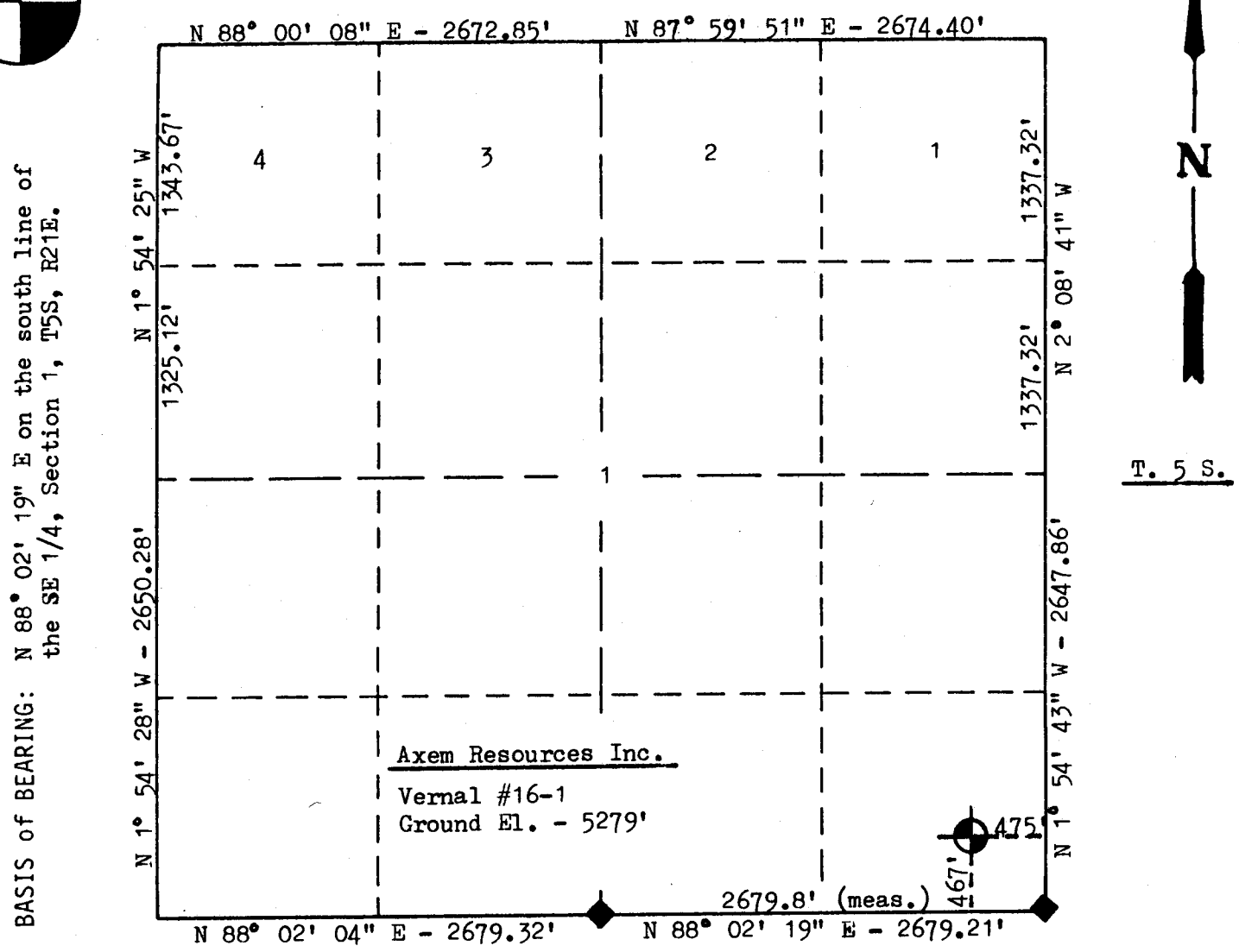
Form PS-102

POWERS ELEVATION,
P.O. Box 2612
Denver, CO 80201-2612
303-321-2217

EXHIBIT "B"

All POWERS ELEVATION, INC. elevations originate from accepted U.S. Benchmarks.

R. 21 E.



BASIS of BEARING: N 88° 02' 19" E on the south line of the SE 1/4, Section 1, T5S, R21E.

Note: Bearings & distances shown are from the Uintah County Survey Control Plat unless otherwise noted.

500 0 500 1000 1500 2500
SCALE IN FEET

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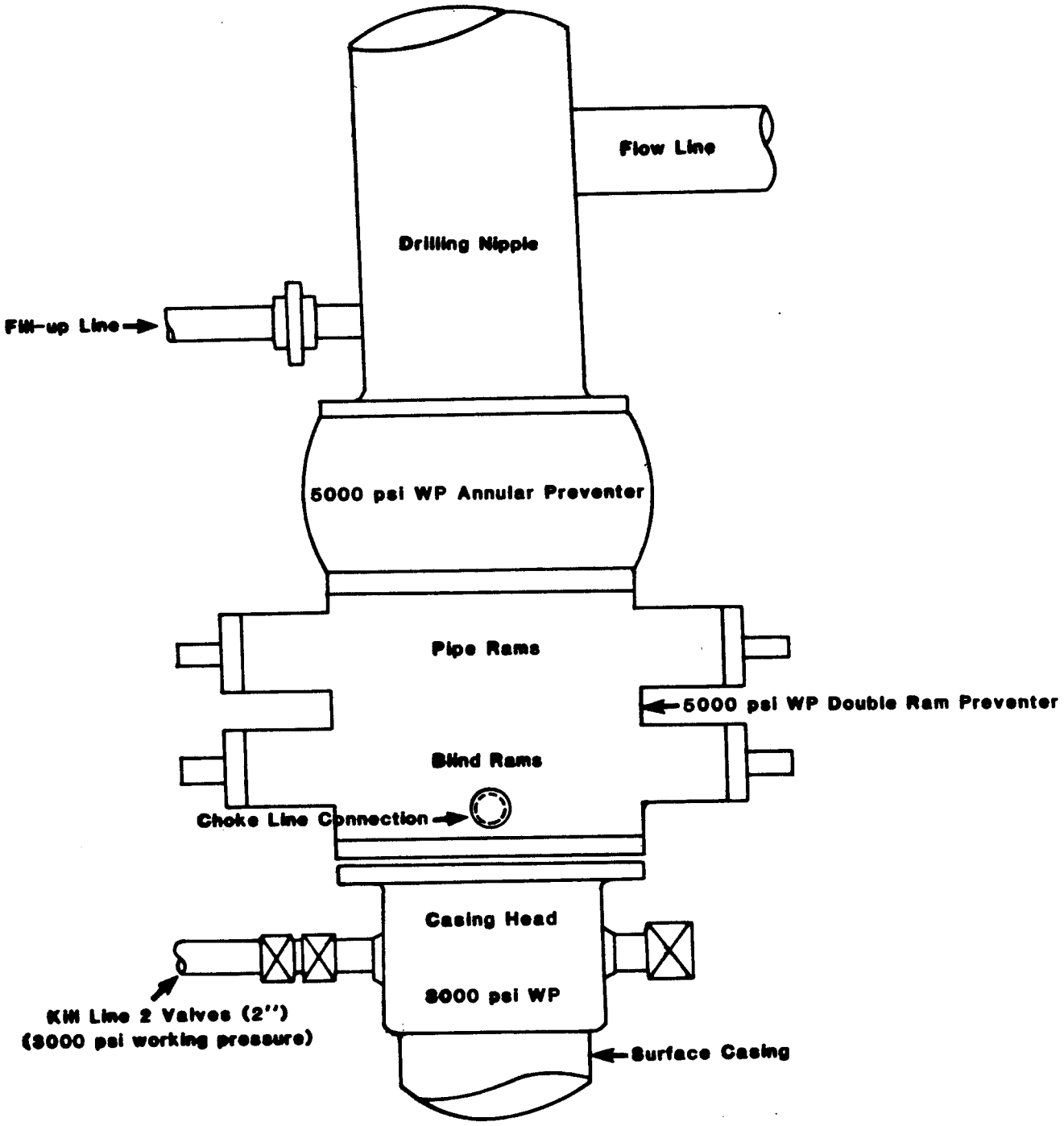
I hereby certify that this plat is an accurate representation of a correct survey showing the location of Vernal #16-1

Date: November 10, 1987

T Tolen

Licensed Land Surveyor No. 2711
State of Utah

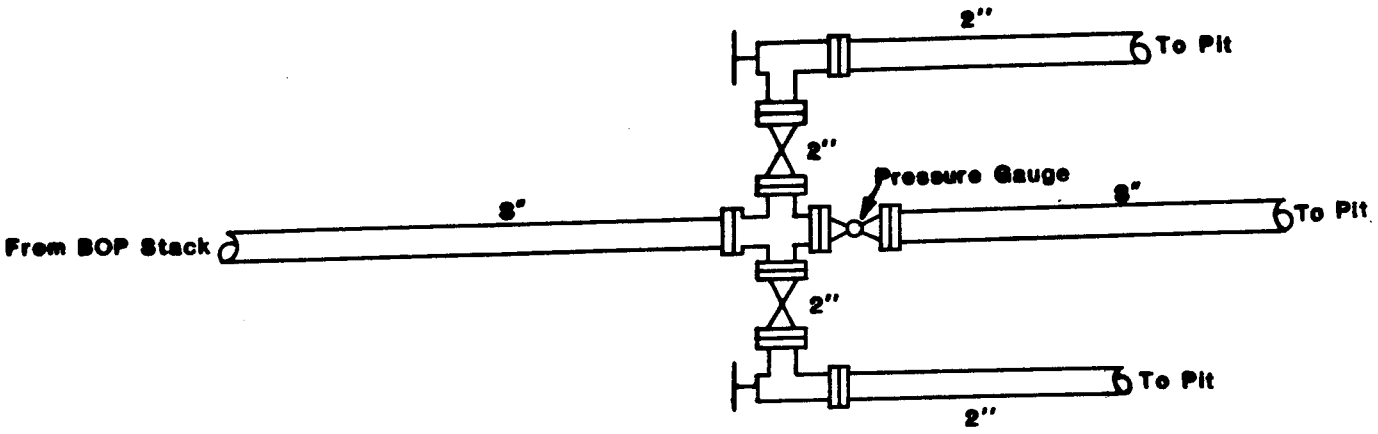
BLOWOUT PREVENTER DIAGRAM



11" 5000 PSI WP Blowout Preventer Stack

EXHIBIT "A2"

CHOKE MANIFOLD DETAIL



All valves, chokes, upstream lines, and fittings are Series 900 (5,000 PSI WP).

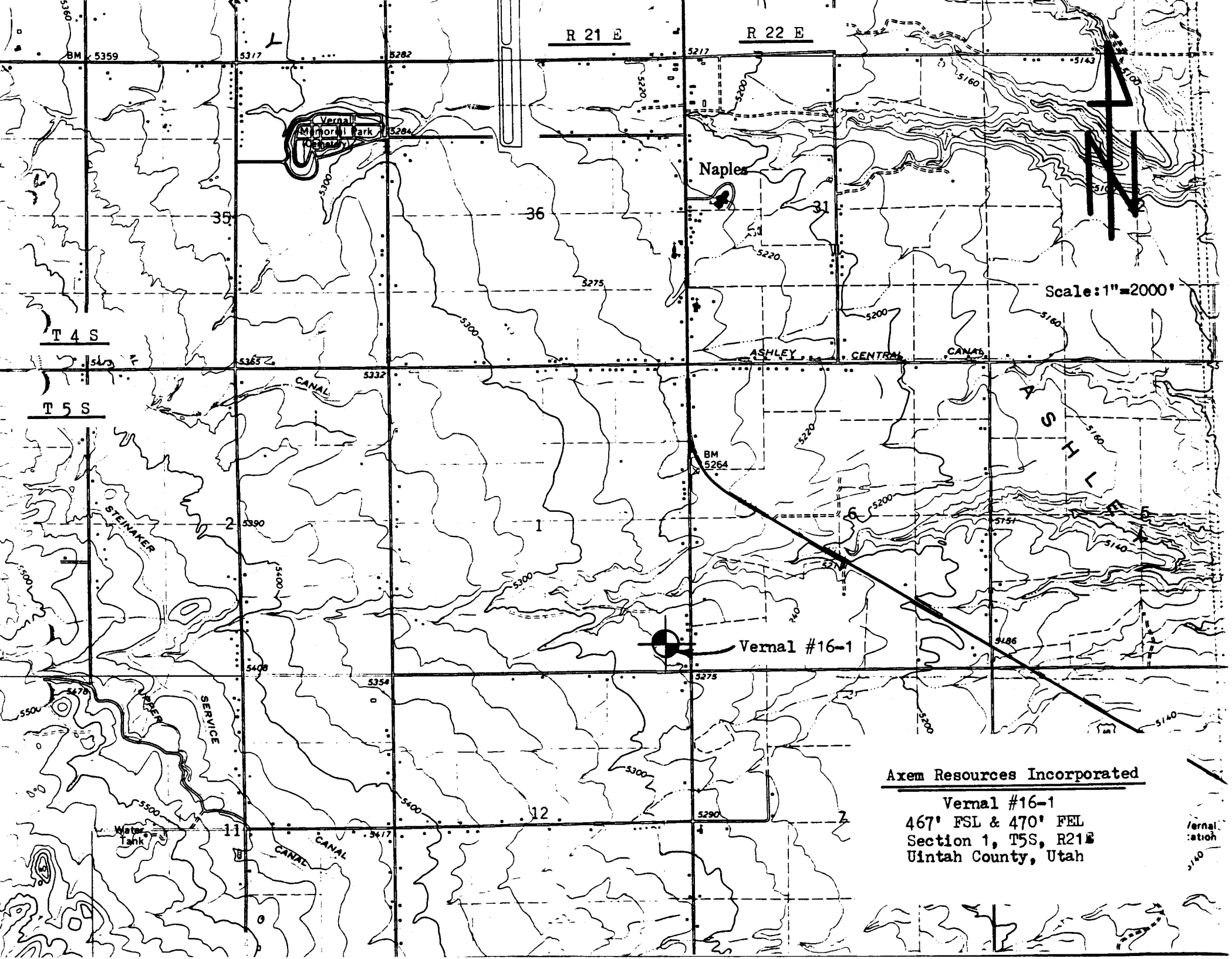
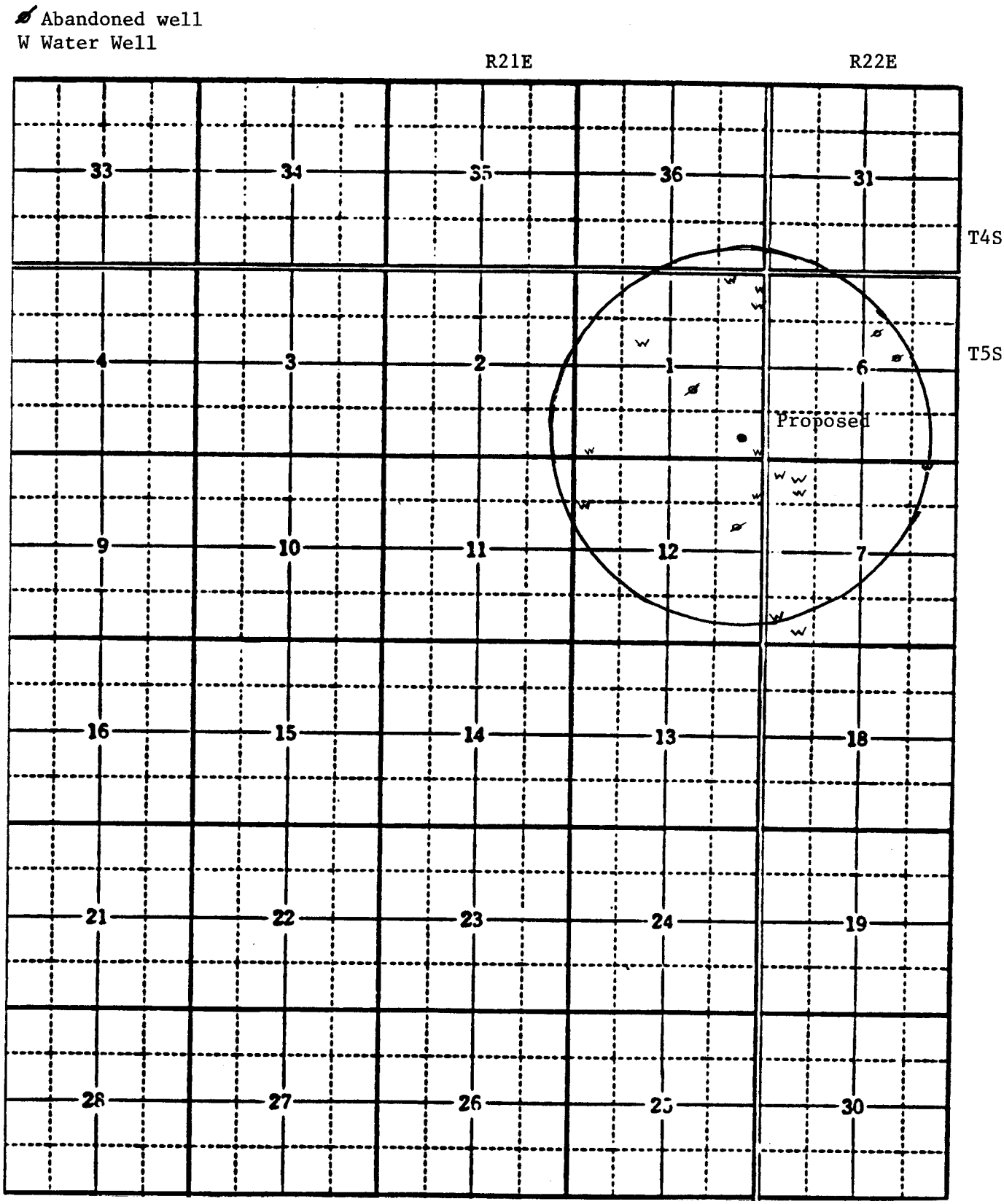

R 21 E
R 22 E
T 4 S
T 5 S
Vernal Memorial Park (Cemetery)
Naples
ASHLEY
CENTRAL
CANAL
ASHLEY CANAL
STEINAKER
UPPER SERVICE CANAL
Water Tank
BM 5359
BM 5264
Vernal #16-1
Scale: 1"=2000'
Axem Resources Incorporated
Vernal #16-1
467' FSL & 470' FEL
Section 1, T5S, R21E
Uintah County, Utah

EXHIBIT "D"


Abandoned well
W Water Well
R21E
R22E
T4S
T5S
Proposed
33
34
35
36
31
4
3
2
1
6
9
10
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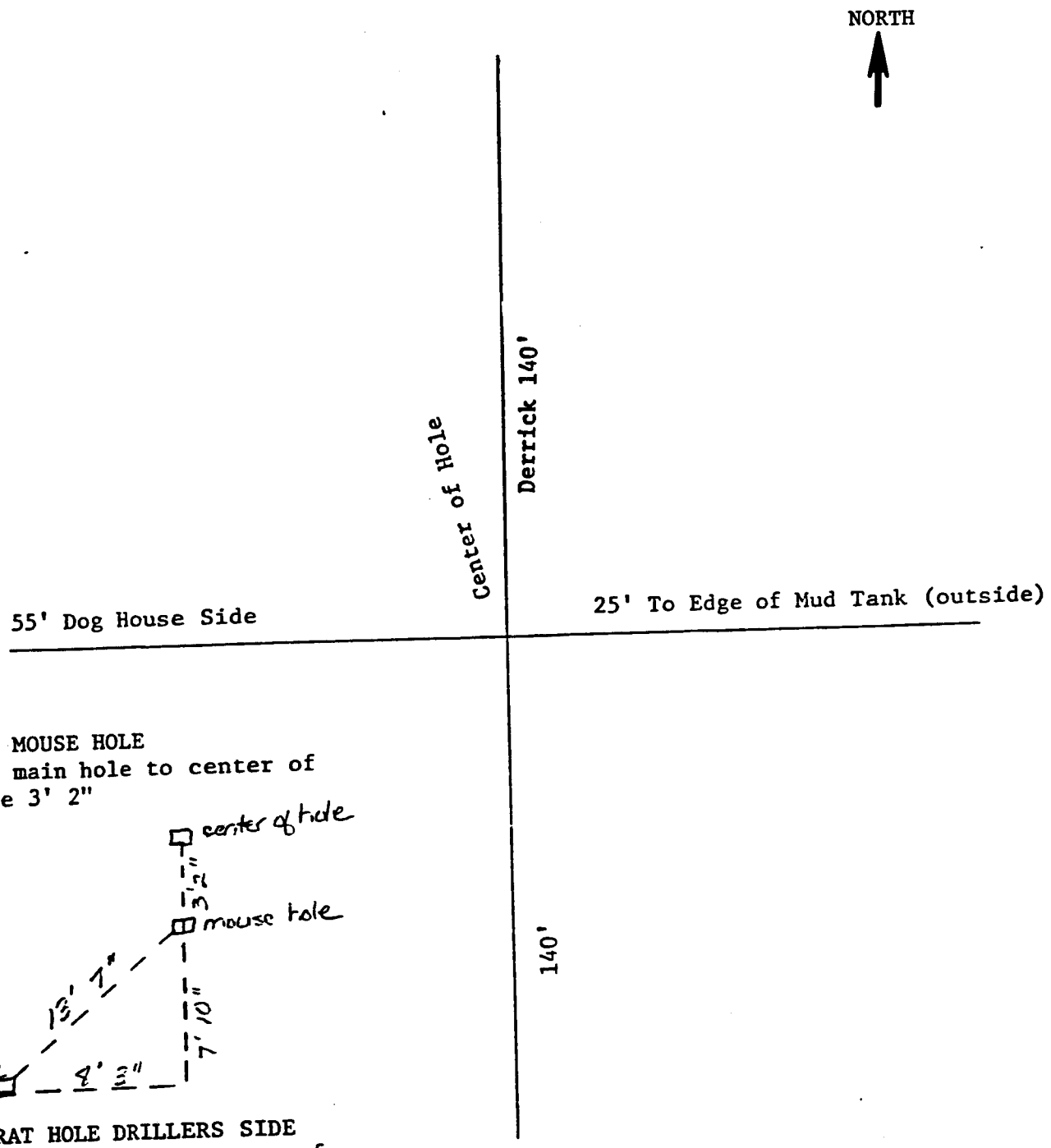
30

EXHIBIT "E"

WIN-ROCK DRILLING COMPANY

RIG NO. 7



MOUSE HOLE
Center of main hole to center of mouse hole 3' 2"

RAT HOLE DRILLERS SIDE
Center of main hole to center of rat hole 13' 7" or from center of main hole to right angle 7' 10"
Right Angle 8' 3"

EXHIBIT "F"

WIN-ROCK DRILLING COMPANY

RIG #7

INVENTORY

CAPACITY:	8,000' with 4" Full Hole Drill Pipe
DRAWWORKS:	National T32 with 22" Double Hydromatic Brake
ENGINES:	2-CAT D343 Diesel Engines rated at 365 H.P. each
PUMP #1:	Emsco DA500 5½" x 16", 500 input H.P. Duplex Powered by 520 H.P. Caterpillar D-379
PUMP #2:	Emsco DA500 5½" x 16", 500 input H.P. powered by two 8V92 Turbo Charged GMC Diesel Engines having 360 H.P. each
MAST:	Lee C. Moore 127' rated at 360,000
SUBSTRUCTURE:	Height 11' x 26' W x 43' L enclosed with steel
MUD TANKS:	Two steel pits with total capacity of 500 barrels, equipped with shale shaker, desander and low pressure mud mixing system
BOP EQUIPMENT:	11" 5,000# PSI Shaffer LWP Double Gate 11" 5,000# PSI G K Hydrill Hydrill 80 gallon closing unit with Duplex Charging Pump, 20 H.P. Electric Motor Choke Manifold rated at 3,000#
DRILL STRING:	7,500'
DRILL COLLARS:	20 spiral 6¼" OD x 2¼" ID with 4½" H90 Connections
TANKS:	500 barrel steel water storage 10,000 gallon steel fuel tanks
GENERATOR:	#1 - CAT 3306 with 155 KW SR CAT generator #2 - GMC 671 with 100 K W KATO generator
MUD MIXING:	5 x 6 Mission Mud Mixing Pump, powered by 50 H.P. Electric Motor
OTHER:	Winterizing Two Air Compressors Vapor Proof Lights Toolpusher's Skid Mounted Bunkhouse Automatic Driller Wire Line Machine Boiler

113007

OPERATOR Upton Resources DATE 11-18-89

WELL NAME Ute 16-1

SEC SE SE 1 T 5S R 21E COUNTY Uintah

43-047-31825
API NUMBER

Fee
TYPE OF LEASE

CHECK OFF:

- [x] PLAT
- [x] BOND
- [x] NEAREST WELL
- [x] LEASE
- [x] FIELD
- [ ] POTASH OR OIL SHALE

PROCESSING COMMENTS:
No other well within 920'
Need water permit

APPROVAL LETTER:

SPACING: [ ] R615-2-3 _____ UNIT [x] R615-3-2

[ ] _____ CAUSE NO. & DATE [ ] R615-3-3

STIPULATIONS:
1- Water
2- Contact Carl Kubly - reserve pit.

0218T

STATE ACTIONS

Mail to:
RDCC Coordinator
116 State Capitol
Salt Lake City, Utah 84114

1. ADMINISTERING STATE AGENCY
OIL, GAS AND MINING
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

2. STATE APPLICATION IDENTIFIER NUMBER:
(assigned by State Clearinghouse)

3. APPROXIMATE DATE PROJECT WILL START:
Upon approval

4. AREAWIDE CLEARING HOUSE(s) RECEIVING STATE ACTIONS:
(to be sent out by agency in block 1)
Uinta Basin Association of Governments

5. TYPE OF ACTION: / / Lease /X/ Permit / / License / / Land Aquisition
/_/ Land Sale /_/ Land Exchange /_/ Other_____

6. TITLE OF PROPOSED ACTION:
Application for Permit to Drill

7. DESCRIPTION:
Axem Resources Inc. proposes to drill a wildcat well, the Vernal #16-1, on a private lease in Uintah County, Utah. This action is being presented to RDCC for consideration of resource issues affecting state interests. The DOGM is the primary administrative agency in this case and must issue approval to drill before operations can commence.

8. LAND AFFECTED (site location map required) (indicate county)
SE/4, SE/4, Section 1, Township 5 South, Range 21 East, Uintah County, Utah

9. HAS THE LOCAL GOVERNMENT(s) BEEN CONTACTED?
Unknown

10. POSSIBLE SIGNIFICANT IMPACTS LIKELY TO OCCUR:
No significant impacts are likely to occur

11. NAME AND PHONE NUMBER OF DISTRICT REPRESENTATIVE FROM YOUR AGENCY NEAR PROJECT SITE, IF APPLICABLE:
Carol Kubly, Vernal, ph. 789-1388

12. FOR FURTHER INFORMATION, CONTACT:
John Baza
PHONE: 538-5340

13. SIGNATURE AND TITLE OF AUTHORIZED OFFICIAL
John R. Baza
DATE: 11-17-87 Petroleum Engineer

Axem
Resources Incorporated

November 19, 1987

State of Utah
Division of Oil, Gas and Mining
355 West North Temple, Suite 250
Salt Lake City, Utah 84180-1203

Attention: Ron Firth

Re: Vernal #16-1
Section 1, R5S-T21E
Uintah County, Utah

Dear Mr. Firth:

Please attach the enclosed permit information to our permit previously filed with your office. We would still like to get started on this well by the 23rd of November. If there are any problems with our permit, please contact Mr. Brook Phifer here in Denver.

When the drilling permit is approved, would you please give Mr. Brook Phifer verbal approval so we may start construction before the holidays.

Thank you for your hurried assistance in the matter.

Sincerely,

AXEM RESOURCES INCORPORATED

Shari L. Janata

KJD Shari L. Janata
Senior Technician

Enclosure

NOV 20 1987

7800 East Union Avenue, Suite 1100 • Denver Technological Center • Denver, Colorado 80237 • 303 740-9000

DRILLING PLAN
VERNAL #16-1
SE SE SECTION 1, T5S-R21E
UINTAH COUNTY, UTAH

DRILLING PROGRAM

1. GEOLOGICAL NAME OF THE SURFACE FORMATION:

MANCOS SHALE COVERED BY ALLURIUM.

2. ESTIMATED TOPS OF IMPORTANT GEOLOGIC MARKERS:

FORMATION	DEPTH GR
FRONTIER	3,579'
DAKOTA	3,939'
MORRISON	4,029'
CURTIS	4,879'
ENTRADA	5,069'
CARMEL	5,299'
NAVAJO	5,419'
CHINLE	6,199'
SHINARUMP	6,419'
MOENKOPI	6,459'
PHOSPHORIA	7,189'
WEBER	7,359'
TOTAL DEPTH	7,500'

3. ESTIMATED DEPTH AT WHICH THE TOP AND BOTTOM OF ANTICIPATED WATER, OIL OR GAS ZONES ARE EXPECTED TO BE ENCOUNTERED:

FORMATION	TOP & BOTTOM DEPTHS	TYPE ZONE
FRONTIER	3,579'-3,689'	SALT WATER/GAS
DAKOTA	3,939'-4,029'	SALT WATER/GAS
UPPER MORRISON	4,029'-4,144'	SALT WATER/GAS
LOWER MORRISON	4,754'-4,879'	SALT WATER
ENTRADA	5,069'-5,104'	SALT WATER
NAVAJO	5,419'-6,204'	SALT WATER
SHINARUMP	6,419'-6,459'	SALT WATER
WEBER	7,359'- TOTAL DEPTH	SALT WATER/OIL

* FOX HILLS WILL BE BEHIND SURFACE CASING. NO OTHER MINERAL BEARING FORMATIONS TO BE ENCOUNTERED.

4. PROPOSED CASING PROGRAM:

INTERVAL	SECTION LENGTH	SIZE (OD)	WEIGHT, GRADE & CONNECTION	NEW OR USED	HOLE SIZE
0'-380'	380'	8 5/8"	24# K-55 LT&C	NEW	10-3/4"
0'-7,500'	7,500'	5 1/2"	17# K-55 LT&C	NEW	7-7/8"

EXACT DEPTHS WILL BE TAKEN FROM OPEN HOLE LOGS.

THE SURFACE CASING WILL BE TESTED TO 1000 PSI PRIOR TO DRILLING OUT. THE PRODUCTION CASING WILL BE TESTED TO 2000 PSI.

5. OPERATOR'S MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL EQUIPMENT WHICH IS TO BE USED:

EXHIBIT "A1" IS A SCHEMATIC DIAGRAM OF THE BLOWOUT PREVENTER STACK. THE PREVENTERS WILL BE HYDRAULICALLY TESTED TO WORKING PRESSURE OF 70% OF CASING YIELD AFTER NIPPLING UP AND AFTER ANY USE UNDER PRESSURE. PIPE RAMS WILL BE OPERATIONALLY CHECKED EACH 24-HOUR PERIOD, AND BLIND RAMS AND ANNULAR WILL BE CHECK ON EVERY TRIP.

A 3000 PSI WP CHOKE MANIFOLD (SEE EXHIBIT "A2") WILL ALSO BE TESTED TO 70% WORKING PRESSURE UPON INSTALLATION.

A 3000 PSI WP GATE VALVE WILL BE PLACED ON THE CHOKE LINES BETWEEN THE BOP'S AND THE CHOKE MANIFOLD.

THE BOP CLOSING UNIT WILL BE EQUIPPED WITH ACCUMULATOR BOTTLES OF SUFFICIENT VOLUMETRIC CAPACITY TO CLOSE ALL RAM PREVENTERS AND ANNULAR PREVENTER, AND RETAIN 200 PSI ABOVE THE ACCEPTABLE PRE- CHARGE PRESSURE. RAM TYPE PREVENTERS WILL BE EQUIPPED WITH SOME TYPE OF MANUAL CONTROL.

A HYDRAULIC CONTROL WILL BE LOCATED ON THE RIG FLOOR, AND A BACKUP CONTROL WILL BE LOCATED IN THE ACCUMULATOR HOUSE.

6. AUXILIARY EQUIPMENT

- KELLY COCK
- DRILL PIPE SAFETY VALVE OR AN INSIDE BLOWOUT PREVENTER

7. PROPOSED MUD SYSTEM:

DEPTH	TYPE	MW (PPG)	VISCOSITY (SEC/QT)	FLUID LOSS (CC)
0'-380'	LIME	8.4-9.0	26-45	N/C
380'-3,500'	WATER/FLOCCULANT	8.4-8.9	26-29	N/C
3,500'-7,500'	LOW SOLIDS, NON-DISPERSED	8.8-9.1	34-40	8-12

8. TESTING, LOGGING & CORING PROGRAM:

(A) DST'S WILL BE DETERMINED BY A GEOLOGIST AT THE WELL SITE.

PROBABLE DST INTERVAL: WEBER
POSSIBLE DST INTERVALS: PHOSPHORIA, FRONTIER, MORRISON, AND ENTRADA

(B) THE LOGGING PROGRAM WILL CONSIST OF:

DUAL LATEROLOG-SFL/GR/CAL	BASE OF SURFACE CASING TO T.D.
ACOUSTIC/GR/CAL	BASE OF SURFACE CASING TO T.D.
DENSITY/NEUTRON/GR/CAL	5,500' TO T.D.
DIPMETER	5,500' TO T.D.

(C) CORES: WILL TAKE A LEAST ONE 30-FOOT CONVENTIONAL CORE AT THE PHOSPHORIA/WEBER BOUNDARY USING A FULL 7-7/8" BIT.

9. CEMENTING PROGRAM

(A) SURFACE CASING WILL BE CEMENTED TO SURFACE, CALCULATIONS OF DRILLED HOLE PLUS 100% EXCESS.

(B) PRODUCTION CASING WILL BE CEMENTED WITH 85 SACKS LITE AND 100 SACKS PREMIUM CEMENT. ACTUAL CEMENT VOLUMES BASED ON CALIPER LOG, CALCULATIONS OF DRILLED HOLE PLUS 35% EXCESS.

10. ANTICIPATED ABNORMAL PRESSURES AND TEMPERATURES; OTHER POTENTIAL HAZARDS:

THE BIGGEST HAZARDS TO BE ENCOUNTERED ON THIS HOLE IS DEVIATION SAFETY PROBLEMS. DEVIATION IS TO LIMITED TO 1 DEGREE IN THE SURFACE PIPE, 1 DEGREE PER 100 FEET DURING DRILLING THE 7-7/8" HOLE AND A MAXIMUM OF 6 DEGREES IN THE HOLE.

HYDROGEN SULFIDE WON'T BE ENCOUNTERED IN THIS WELL.

SURFACE USE PROGRAM

VERNAL #16-1
SE SE SECTION 1-T5S-R21E
UINTAH COUNTY, UTAH

SURFACE USE PROGRAM

1. WELLSITE AND ACCESS ROADS

A. PROPOSED WELL SITE: 467' FSL AND 475' FEL, SECTION 1, T5S-R21E, UINTAH COUNTY, UTAH. SEE EXHIBIT "B".

B. ROUTE AND DISTANCE FROM NEAREST TOWN: APPROXIMATELY 3/4 OF A MILE SOUTH OF NAPLES CITY OFFICES. CITY OFFICES ARE LOCATED ONE BLOCK WEST OF 1500 EAST AND HIGHWAY 40 JUNCTION.

C. ALL EXISTING, PRIVATELY OWNED ROADS WILL BE MAINTAINED IN THEIR PRESENT CONDITION OR BETTER.

D. EXISTING ROADS WITHIN 1 MILE OF WELL: SEE EXHIBIT "C". IMPROVED SECONDARY ROADS ARE PAVED.

E. PLANS FOR IMPROVEMENT AND/OR MAINTENANCE FOR EXISTING ROADS:

(1) EXISTING IMPROVED AND FIELD ROADS WILL BE MAINTAINED BY BLADING AND CENTER-CROWNING AS REQUIRED.

F. ALL EQUIPMENT AND VEHICLES WILL BE CONFINED TO THE ACCESS ROAD, PAD, AND AREAS SPECIFIED HEREIN.

G. ENTIRE LOCATION WILL BE FENCED IN WITH WOVEN WIRE FNECE WITH TWO ROWS OF BOBWIRE ON TOP.

H. THE DRILLING RIG WILL HAVE WEATHER PROOF TARPS AROUND THE DRILLING FLOOR TO KEEP SOUND DOWN.

I. THE LIGHTS FROM THE RIG WILL BE POINTED AWAY FROM THE RESIDENTS.

2. DURING CONSTRUCTION

A. THE TOP SOIL WILL BE REMOVED, INCLUDING AREAS OF CUT, FILL, AND/OR SUBSOIL STORAGE AREAS AND STOCKPILED AT THE SITE.

B. THE RESERVE PIT WILL BE LINED AND DESIGNED TO PREVENT THE COLLECTION OF SURFACE RUNOFF.

C. IF ANY CULTURAL VALUES ARE OBSERVED DURING OPERATIONS, WE WILL SHUT DOWN ALL OPERATIONS IMMEDIATELY, LEAVE CULTURAL RESOURCES INTACT AND NOTIFY THE SURFACE OWNER AT ONCE.

3. CONSTRUCTION MATERIALS

SOURCE OF CONSTRUCTION MATERIALS: IF NEEDED, GRAVEL WILL BE OBTAINED FROM AN APPROVED PIT OWNED BY SURFACE OWNERS.

4. ACCESS ROADS TO BE CONSTRUCTED OR RECONSTRUCTED

APPROXIMATELY 500' OF ACCESS ROAD WILL BE IMPROVED

5. LOCATION OF EXISTING WELLS WITHIN 1 MILE OF PROPOSED WELL.

SEE EXHIBIT "D". EXISTING WELLS ARE:

A. WATER WELLS: FOURTEEN

B. ABANDONED WELLS: FOUR

C. TEMPORARILY ABANDONED WELLS: NONE

D. DISPOSAL WELLS: NONE

E. DRILLING WELLS: NONE

F. PRODUCING WELLS: NONE

G. SHUT-IN WELLS: NONE

H. INJECTION WELLS: NONE

I. MONITORING/OBSERVATION WELLS: NONE

6. LOCATION AND TYPE OF WATER SUPPLY

A. FRESH WATER: APPROXIMATELY 900 FEET NORTH A PROPOSED LOCATION. CLADE HOLMES DRAINAGE

B. SALT WATER: NONE

C. METHOD OF TRANSPORATION: WATER FOR DRILLING WILL BE PIPED TO LOCATION.

D. WATER WELLS TO BE DRILLED ON LEASE: NONE

7. IF WELL IS PRODUCTIVE

A. IF WELL IS PRODUCTIVE, A SUNDRY NOTICE WILL BE SUBMITTED SHOWING A DETAILED LAYOUT OF THE PRODUCTION FACILITIES.

B. PRODUCTION FACILITIES (INCLUDING DIKES) WILL BE PLACED ON THE CUT PORTION OF THE LOCATION.

C. THE ENTIRE LOCATION WILL BE FENCED ON ALL SIDES UNTIL DRILLING IS COMPLETED, AND LOCATION RESTORED. FENCE WILL CONSIST OF WOVEN WIRE WITH TWO ROWS OF BOBWIRE ON TOP.

D. A DIKE WILL BE CONSTRUCTED AROUND THE PRODUCTION TANKS. THE DIKES WILL BE CONSTRUCTED OF COMPACTED SUBSOIL, BE IMPERVIOUS, HOLD THE CAPICITY OF THE LARGEST TANK, AND BE INDEPENDENT OF THE BACK CUT.

E. THE ACCESS ROADS WILL BE MAINTAINED AS NECESSARY TO PREVENT SOIL EROSION AND ACCOMODATE YEAR-ROUND TRAFFIC.

F. FOR ANY AREA NOT REQUIRED FOR PRODUCTION, CONTOUR WILL BE RESTORED, COVERED WITH TOPSOIL, AND RE-SEEDED PER SURFACE OWNERS SPECIFICATIONS.

G. THOSE AREAS NOT REQUIRED FOR PRODUCTION WILL BE LANDSCAPED TO THE SURROUNDING TOPOGRAPHY.

H. THE BACKSLOPE WILL BE REDUCED TO 2:1 AND THE FORESLOPE TO 2:1. SLOPES WILL BE REDUCED BY PULLING FILL MATERIAL UP FROM THE FORESLOPE INTO THE TOE OF CUT SLOPES.

I. ALL EQUIPMENT AND VEHICLES WILL BE CONFINED TO THE ACCESS ROADS, PAD AND AREAS SPECIFIED IN THE APD.

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WASTE MATERIALS WILL BE DISPOSED OF IN PITS AS SHOWN BELOW. DURING DRILLING, BURN PIT TO BE ENCLOSED WITH WIRE MESH TO PREVENT SCATTERING OF TRASH.

THE RESERVE PIT WILL BE DESIGNED TO PREVENT THE COLLECTION OF SURFACE RUNOFF. A DIKE WILL BE PUT AROUND PIT AND ENTIRE LOCATION TO PREVENT RUNOF.

A. CUTTINGS: RESERVE PIT.

B. PRODUCING FLUIDS:

1. WATER: RESERVE PIT.

2. OIL: TO TANK BATTERY. ANY OIL PICKED UP IN MUD OR FROM DST'S TO RESERVE PIT THEN HAULED AWAY WHEN DRILLING COMPLETED.

C. DRILLING FLUIDS (INCLUDING SALTS & CHEMICALS): RESERVE PIT.

D. SEWAGE:

1. DURING DRILLING: ROCK & SANITATION WILL BE HANDLING SEWAGE DISPOSAL. THERE WILL BE SURFACE SEPTIC TANK AND WILL BE HAULED OFF AFTER WELL IS COMPLETED.

2. DURING PRODUCTION: NONE

E. GARBAGE AND OTHER WASTE: TO BURN PIT. THE BURN PIT WILL BE COMPLETELY ENCLOSED WITH SMALL MESH WIRE. TRASH WILL BE COVERED WITH 4 FEET OF EARTH.

F. GENERAL CLEAN-UP: WHEN RIG IS MOVED OFF LOCATION, OPERATOR WILL DO EVERYTHING WITHIN REASON TO CLEAN UP LOCATION.

9. ANCILLARY FACILITIES

THERE WILL BE NO CAMPS OR AIRSTRIPS.

10. WELL SITE LAYOUT

SURVEYED LOCATION PLAT. SEE EXHIBIT "B".

A. DRILLING PAD: SEE EXHIBIT "E"

B. LOCATION OF RIG EQUIPMENT AND FACILITIES: SEE EXHIBIT "F".

(1) RIG ORIENTATION: SEE EXHIBIT "F".

(2) ACCESS ROADS: SEE EXHIBITS "C".

11. IF WELL IS A DRY HOLE

A. ALL DISTURBED AREAS OF WELLSITE AND ACCESS WILL BE RESTORED FOR CULTIVATION.

B. THE DISTURBED AREAS INCLUDING THE ACCESS ROAD WILL BE RE-SHAPED SO THAT THE AREA WILL BLEND WITH THE SURROUNDING TOPOGRAPHY, BY PUSHING THE FILL MATERIAL INTO THE CUT AREA. NO DEPRESSION CAPABLE OF TRAPPING WATER OR FORMING PONDS WILL REMAIN IN THE AREA.

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E. THE RECLAMATION PROGRAM WILL BEGIN AFTER RIGS ARE MOVED, BUT NO LATER THAN SIX MONTHS FOLLOWING COMPLETION, WEATHER PERMITTING.

F. WILL CONSTRUCT AND MAINTAIN STOCK-TIGHT FENCE AROUND THE ENTIRE LOCATION UNTIL EFFECTIVE VEGETATION COVER HAS BEEN ESTABLISHED.

12. SURFACE OWNERSHIP

THE LOCATION AND ROAD ARE ON FEE LANDS OWNED BY GLADE HOLMES, WHO IS ALSO MINERAL OWNER TOO.

13. OTHER INFORMATION

A. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO KNOWN ARCHEOLOGICAL, HISTORICAL OR CULTURAL SITES IN THE IMMEDIATE AREA. ALL LANDS INVOLVED IN LOCATION AND ACCESS ROAD HAVE PREVIOUSLY BEEN CULTIVATED AND AT PRESENT IS AN ALPHALFA FIELD.

B. ESTIMATED STARTING DATE & DURATTION: 11/25/87 TO 02/25/88. ACTUAL DRILL TIME IS ESTIMATED ABOUT 3 WEEKS. WITH COMPLETING AND PUTTING WELL ON PRODUCTION (WITH HOLIDAYS BEING TAKEN INTO CONSIDERATION) WE SHOULD BE DONE BY FEBRUARY 25, 1988.

14. OPERATOR'S REPRESENTATION AND CERTIFICATION

OPERATOR'S FIELD REPRESENTATIVE:

DON BOWDEN
846 NORTH, 2500 WEST
VERNAL, UTAH 84078

HOME PHONE: (801) 789-2020

OPERATOR'S OFFICE REPRESENTATIVE:

NEAL LEAFDALE
800 W. WERNER CT
CASPER, WYOMING 82601

WORK PHONE: (307) 266-3856

CERTIFICATION:

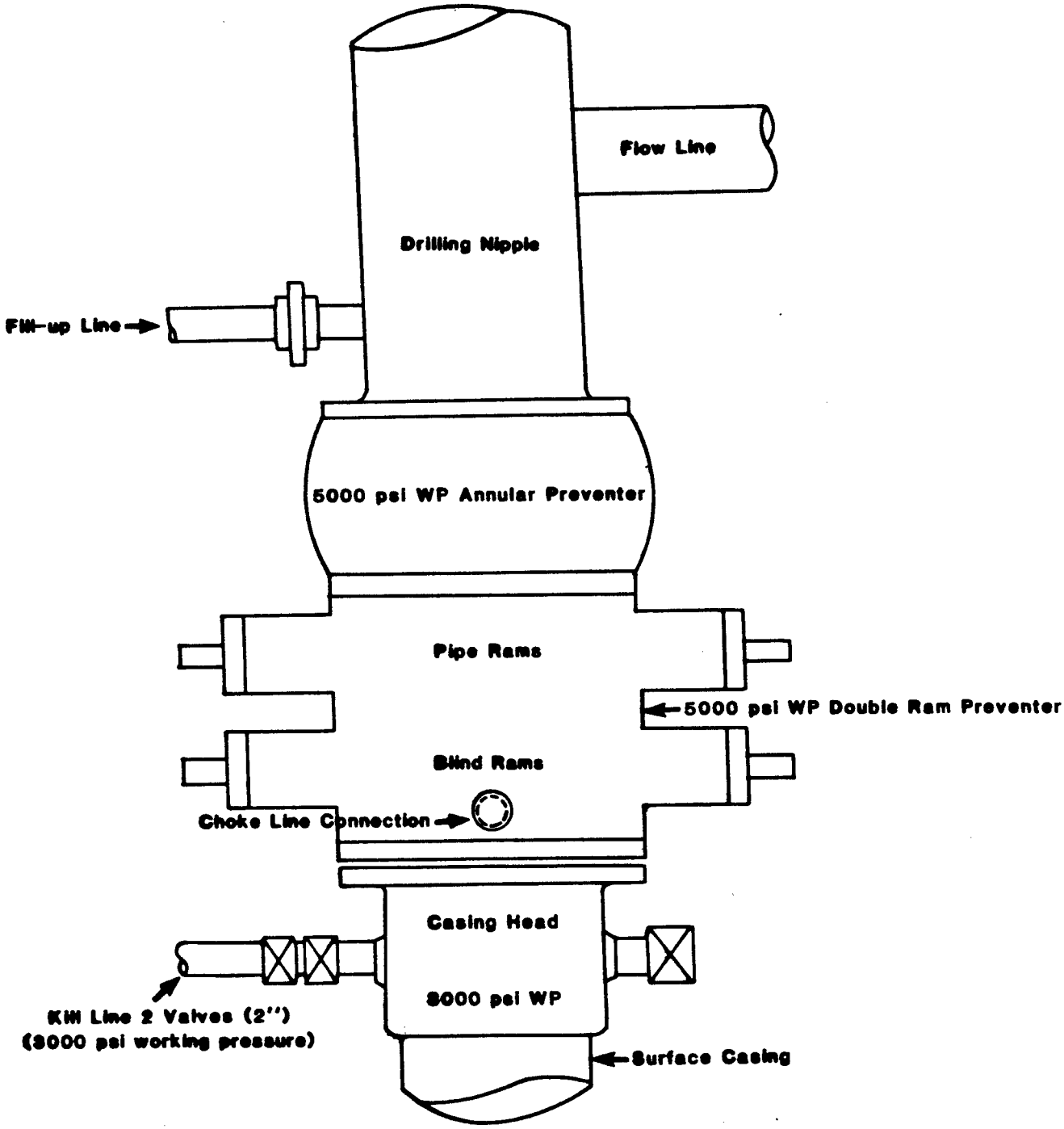
I HEREBY CERTIFY THAT I, OR PERSONS UNDER MY DIRECT SUPERVISION, HAVE INSPECTED THE PROPOSED DRILL SITE AND ACCESS ROUTE; THAT I AM FAMILIAR WITH THE CONDITIONS WHICH PRESENTLY EXIST; THAT THE STATEMENTS MADE IN THIS PLAN ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND CORRECT; AND THAT THE WORK ASSOCIATED WITH OPERATIONS PROPOSED HEREIN WILL BE PERFORMED BY AXEM RESOURCES INCORPORATED AND ITS CONTRACTORS AND SUBCONTRACTORS IN CONFORMITY WITH THIS PLAN ND THE TERMS AND CONDITIONS UNDER WHICH IT IS APPROVED. THIS STATEMENT IS SUBJECT TO THE PROVISIONS OF 18 U.S.C. 1001 FOR THE FILING OF A FALSE STATEMENT.

11/19/87
DATE

Kenneth J. DeFehr
KENNETH J. DEFEHR, P.E.
SENIOR PETROLEUM ENGINEER
AXEM RESOURCES INCORPORATED

EXHIBIT "A1"

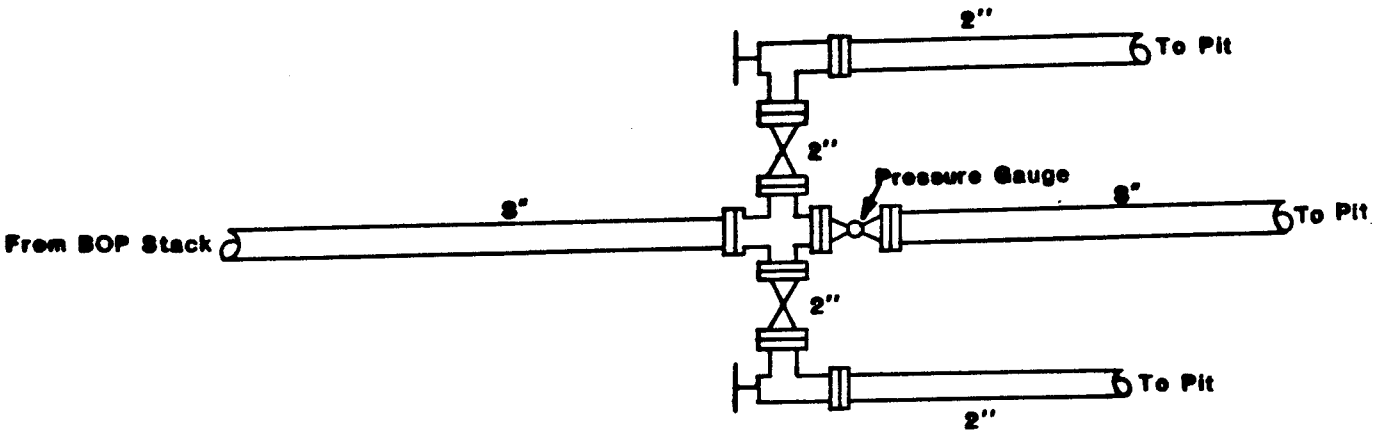
BLOWOUT PREVENTER DIAGRAM



11" 5000 PSI WP Blowout Preventer Stack

EXHIBIT "A2"

CHOKE MANIFOLD DETAIL



All valves, chokes, upstream lines, and fittings are Series 900 (5,000 PSI WP).

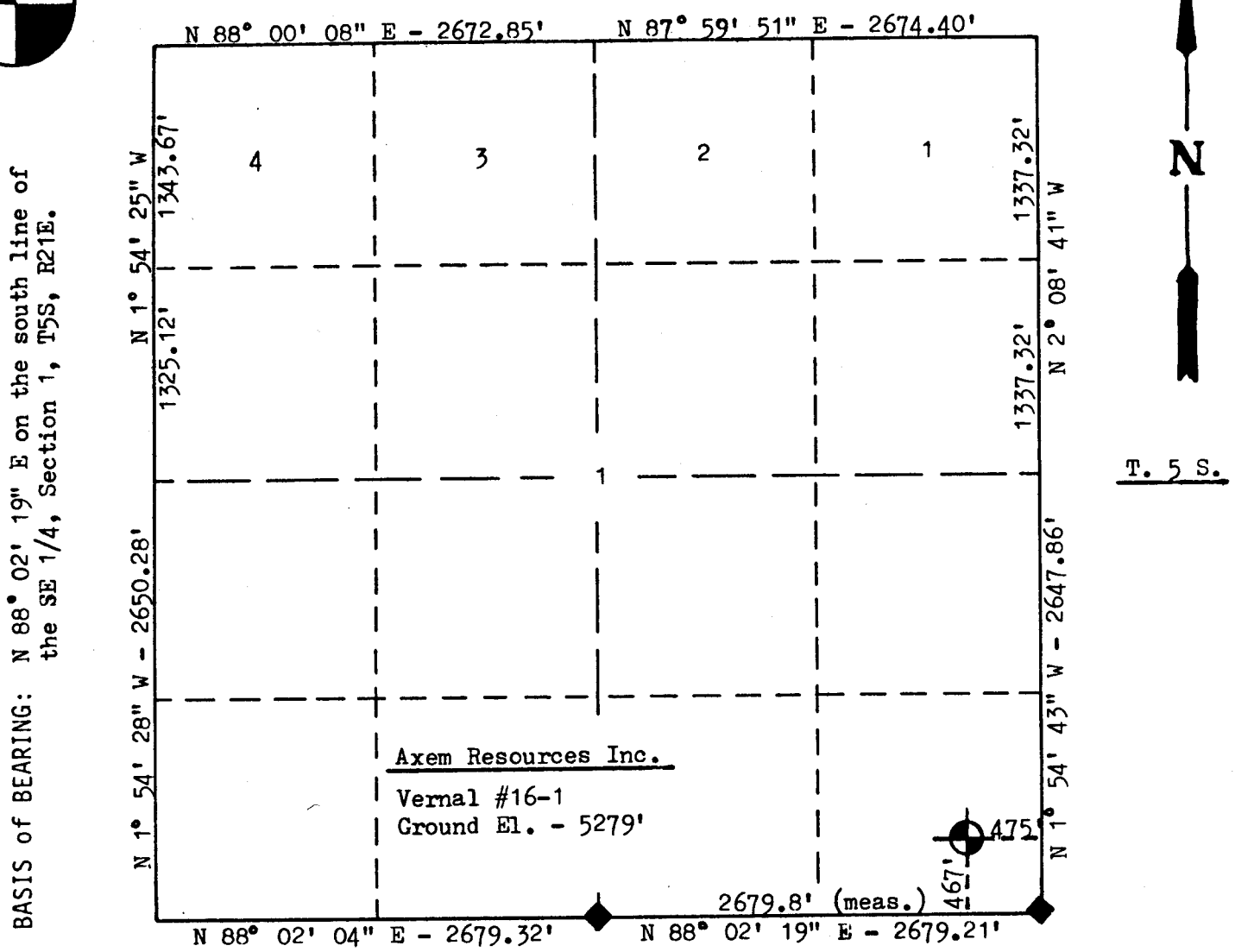
Form PS-102

POWERS ELEVATION, INC.
P.O. Box 2612
Denver, CO 80201-2612
303-321-2217

EXHIBIT "B"

All POWERS ELEVATION, INC. elevations originate from accepted U.S. Benchmarks.

R. 21 E.



Note: Bearings & distances shown are from the Uintah County Survey Control Plat unless otherwise noted.

500 0 500 1000 1500 2500
SCALE IN FEET

◆ - Indicates Uintah County survey cap found.

Powers Elevation, Inc. of Denver, Colorado has in accordance with a request from Neal Leafdale for Axem Resources Incorporated determined the location of Vernal #16-1 to be 467' FSL & 475' FEL Section 1, Township 5 South Range 21 East of the Salt Lake Meridian, Uintah County, Utah.

I hereby certify that this plat is an accurate representation of a correct survey showing the location of Vernal #16-1

Date: November 10, 1987

T Tolton

Licensed Land Surveyor No. 2711
State of Utah

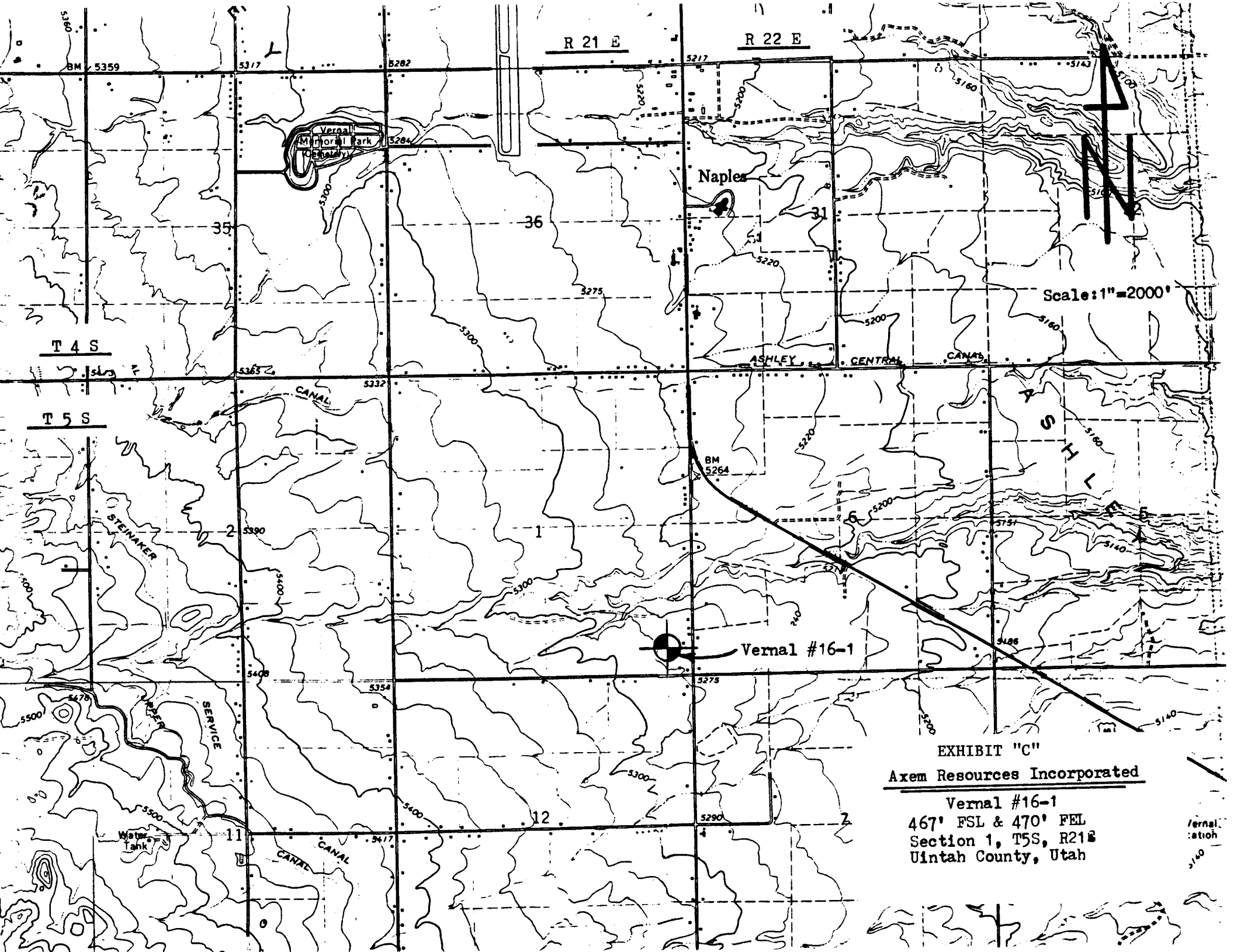


EXHIBIT "C"

Axem Resources Incorporated

Vernal #16-1
467' FSL & 470' FEL
Section 1, T5S, R21E
Uintah County, Utah

EXHIBIT "E"

WIN-ROCK DRILLING COMPANY

RIG NO. 7

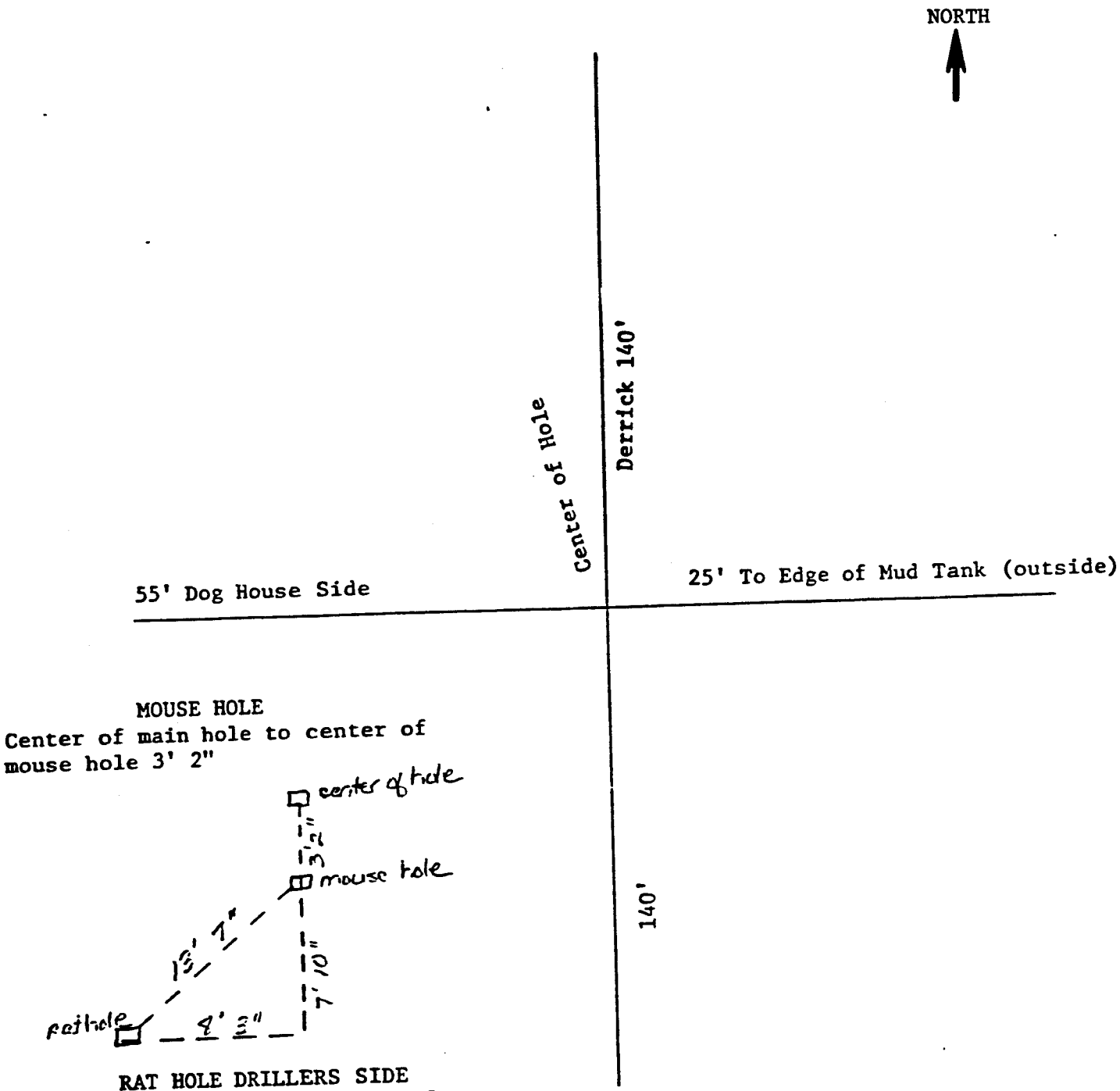


EXHIBIT "F"

WIN-ROCK DRILLING COMPANY

RIG #7

INVENTORY

CAPACITY:	8,000' with 4" Full Hole Drill Pipe
DRAWWORKS:	National T32 with 22" Double Hydromatic Brake
ENGINES:	2-CAT D343 Diesel Engines rated at 365 H.P. each
PUMP #1:	Emsco DA500 5½" x 16", 500 input H.P. Duplex Powered by 520 H.P. Caterpillar D-379
PUMP #2:	Emsco DA500 5½" x 16", 500 input H.P. powered by two 8V92 Turbo Charged GMC Diesel Engines having 360 H.P. each
MAST:	Lee C. Moore 127' rated at 360,000
SUBSTRUCTURE:	Height 11' x 26' W x 43' L enclosed with steel
MUD TANKS:	Two steel pits with total capacity of 500 barrels, equipped with shale shaker, desander and low pressure mud mixing system
BOP EQUIPMENT:	11" 5,000# PSI Shaffer LWP Double Gate 11" 5,000# PSI G K Hydrill Hydrill 80 gallon closing unit with Duplex Charging Pump, 20 H.P. Electric Motor Choke Manifold rated at 3,000#
DRILL STRING:	7,500'
DRILL COLLARS:	20 spiral 6¼" OD x 2¼" ID with 4½" H90 Connections
TANKS:	500 barrel steel water storage 10,000 gallon steel fuel tanks
GENERATOR:	#1 - CAT 3306 with 155 KW SR CAT generator #2 - GMC 671 with 100 K W KATO generator
MUD MIXING:	5 x 6 Mission Mud Mixing Pump, powered by 50 H.P. Electric Motor
OTHER:	Winterizing Two Air Compressors Vapor Proof Lights Toolpusher's Skid Mounted Bunkhouse Automatic Driller Wire Line Machine Boiler

DRILLING PLAN
VERNAL #16-1
SE SE SECTION 1, T5S-R21E
UINTAH COUNTY, UTAH

DRILLING PROGRAM

1. GEOLOGICAL NAME OF THE SURFACE FORMATION:

MANCOS SHALE COVERED BY ALLURIUM.

2. ESTIMATED TOPS OF IMPORTANT GEOLOGIC MARKERS:

FORMATION	DEPTH GR
FRONTIER	3,579'
DAKOTA	3,939'
MORRISON	4,029'
CURTIS	4,879'
ENTRADA	5,069'
CARMEL	5,299'
NAVAJO	5,419'
CHINLE	6,199'
SHINARUMP	6,419'
MOENKOPI	6,459'
PHOSPHORIA	7,189'
WEBER	7,359'
TOTAL DEPTH	7,500'

3. ESTIMATED DEPTH AT WHICH THE TOP AND BOTTOM OF ANTICIPATED WATER, OIL OR GAS ZONES ARE EXPECTED TO BE ENCOUNTERED:

FORMATION	TOP & BOTTOM DEPTHS	TYPE ZONE
FRONTIER	3,579'-3,689'	SALT WATER/GAS
DAKOTA	3,939'-4,029'	SALT WATER/GAS
UPPER MORRISON	4,029'-4,144'	SALT WATER/GAS
LOWER MORRISON	4,754'-4,879'	SALT WATER
ENTRADA	5,069'-5,104'	SALT WATER
NAVAJO	5,419'-6,204'	SALT WATER
SHINARUMP	6,419'-6,459'	SALT WATER
WEBER	7,359'- TOTAL DEPTH	SALT WATER/OIL

* FOX HILLS WILL BE BEHIND SURFACE CASING. NO OTHER MINERAL BEARING FORMATIONS TO BE ENCOUNTERED.

4. PROPOSED CASING PROGRAM:

INTERVAL	SECTION LENGTH	SIZE (OD)	WEIGHT, GRADE & CONNECTION	NEW OR USED	HOLE SIZE
0'-380'	380'	8 5/8"	24# K-55 LT&C	NEW	10-3/4"
0'-7,500'	7,500'	5 1/2"	17# K-55 LT&C	NEW	7-7/8"

EXACT DEPTHS WILL BE TAKEN FROM OPEN HOLE LOGS.

THE SURFACE CASING WILL BE TESTED TO 1000 PSI PRIOR TO DRILLING OUT. THE PRODUCTION CASING WILL BE TESTED TO 2000 PSI.

5. OPERATOR'S MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL EQUIPMENT WHICH IS TO BE USED.

EXHIBIT "A1" IS A SCHEMATIC DIAGRAM OF THE BLOWOUT PREVENTER STACK. THE PREVENTERS WILL BE HYDRAULICALLY TESTED TO WORKING PRESSURE OF 70% OF CASING YIELD AFTER NIPPLING UP AND AFTER ANY USE UNDER PRESSURE. PIPE RAMS WILL BE OPERATIONALLY CHECKED EACH 24-HOUR PERIOD, AND BLIND RAMS AND ANNULAR WILL BE CHECK ON EVERY TRIP.

A 3000 PSI WP CHOKE MANIFOLD (SEE EXHIBIT "A2") WILL ALSO BE TESTED TO 70% WORKING PRESSURE UPON INSTALLATION.

A 3000 PSI WP GATE VALVE WILL BE PLACED ON THE CHOKE LINES BETWEEN THE BOP'S AND THE CHOKE MANIFOLD.

THE BOP CLOSING UNIT WILL BE EQUIPPED WITH ACCUMULATOR BOTTLES OF SUFFICIENT VOLUMETRIC CAPACITY TO CLOSE ALL RAM PREVENTERS AND ANNULAR PREVENTER, AND RETAIN 200 PSI ABOVE THE ACCEPTABLE PRE- CHARGE PRESSURE. RAM TYPE PREVENTERS WILL BE EQUIPPED WITH SOME TYPE OF MANUAL CONTROL.

A HYDRAULIC CONTROL WILL BE LOCATED ON THE RIG FLOOR, AND A BACKUP CONTROL WILL BE LOCATED IN THE ACCUMULATOR HOUSE.

6. AUXILIARY EQUIPMENT

- KELLY COCK
- DRILL PIPE SAFETY VALVE OR AN INSIDE BLOWOUT PREVENTER

7. PROPOSED MUD SYSTEM:

DEPTH	TYPE	MW (PPG)	VISCOSITY (SEC/QT)	FLUID LOSS (CC)
0'-380'	LIME	8.4-9.0	26-45	N/C
380'-3,500'	WATER/FLOCCULANT	8.4-8.9	26-29	N/C
3,500'-7,500'	LOW SOLIDS, NON-DISPERSED	8.8-9.1	34-40	8-12

8. TESTING, LOGGING & CORING PROGRAM:

(A) DST'S WILL BE DETERMINED BY A GEOLOGIST AT THE WELL SITE.

PROBABLE DST INTERVAL: WEBER
POSSIBLE DST INTERVALS: PHOSPHORIA, FRONTIER, MORRISON, AND ENTRADA

(B) THE LOGGING PROGRAM WILL CONSIST OF:

DUAL LATEROLOG-SFL/GR/CAL	BASE OF SURFACE CASING TO T.D.
ACOUSTIC/GR/CAL	BASE OF SURFACE CASING TO T.D.
DENSITY/NEUTRON/GR/CAL	5,500' TO T.D.
DIPMETER	5,500' TO T.D.

(C) CORES: WILL TAKE A LEAST ONE 30-FOOT CONVENTIONAL CORE AT THE PHOSPHORIA/WEBER BOUNDARY USING A FULL 7-7/8" BIT.

9. CEMENTING PROGRAM:

(A) SURFACE CASING WILL BE CEMENTED TO SURFACE, CALCULATIONS OF DRILLED HOLE PLUS 100% EXCESS.

(B) PRODUCTION CASING WILL BE CEMENTED WITH 85 SACKS LITE AND 100 SACKS PREMIUM CEMENT. ACTUAL CEMENT VOLUMES BASED ON CALIPER LOG. CALCULATIONS OF DRILLED HOLE PLUS 35% EXCESS.

10. ANTICIPATED ABNORMAL PRESSURES AND TEMPERATURES; OTHER POTENTIAL HAZARDS:

THE BIGGEST HAZARDS TO BE ENCOUNTERED ON THIS HOLE IS DEVIATION SAFETY PROBLEMS. DEVIATION IS TO LIMITED TO 1 DEGREE IN THE SURFACE PIPE, 1 DEGREE PER 100 FEET DURING DRILLING THE 7-7/8" HOLE AND A MAXIMUM OF 6 DEGREES IN THE HOLE.

HYDROGEN SULFIDE WON'T BE ENCOUNTERED IN THIS WELL.

SURFACE USE PROGRAM

VERNAL #16-1
SE SE SECTION 1-T5S-R21E
UINTAH COUNTY, UTAH

SURFACE USE PROGRAM

1. WELLSITE AND ACCESS ROADS

A. PROPOSED WELL SITE: 467' FSL AND 475' FEL, SECTION 1, T5S-R21E, UINTAH COUNTY, UTAH. SEE EXHIBIT "B".

B. ROUTE AND DISTANCE FROM NEAREST TOWN: APPROXIMATELY 3/4 OF A MILE SOUTH OF NAPLES CITY OFFICES. CITY OFFICES ARE LOCATED ONE BLOCK WEST OF 1500 EAST AND HIGHWAY 40 JUNCTION.

C. ALL EXISTING, PRIVATELY OWNED ROADS WILL BE MAINTAINED IN THEIR PRESENT CONDITION OR BETTER.

D. EXISTING ROADS WITHIN 1 MILE OF WELL: SEE EXHIBIT "C". IMPROVED SECONDARY ROADS ARE PAVED.

E. PLANS FOR IMPROVEMENT AND/OR MAINTENANCE FOR EXISTING ROADS:

(1) EXISTING IMPROVED AND FIELD ROADS WILL BE MAINTAINED BY BLADING AND CENTER-CROWNING AS REQUIRED.

F. ALL EQUIPMENT AND VEHICLES WILL BE CONFINED TO THE ACCESS ROAD, PAD, AND AREAS SPECIFIED HEREIN.

G. ENTIRE LOCATION WILL BE FENCED IN WITH WOVEN WIRE FNECE WITH TWO ROWS OF BOBWIRE ON TOP.

H. THE DRILLING RIG WILL HAVE WEATHER PROOF TARPS AROUND THE DRILLING FLOOR TO KEEP SOUND DOWN.

I. THE LIGHTS FROM THE RIG WILL BE POINTED AWAY FROM THE RESIDENTS.

2 DURING CONSTRUCTION

A. THE TOP SOIL WILL BE REMOVED, INCLUDING AREAS OF CUT, FILL, AND/OR SUBSOIL STORAGE AREAS AND STOCKPILED AT THE SITE.

B. THE RESERVE PIT WILL BE LINED AND DESIGNED TO PREVENT THE COLLECTION OF SURFACE RUNOFF.

C. IF ANY CULTURAL VALUES ARE OBSERVED DURING OPERATIONS, WE WILL SHUT DOWN ALL OPERATIONS IMMEDIATELY, LEAVE CULTURAL RESOURCES INTACT AND NOTIFY THE SURFACE OWNER AT ONCE.

3. CONSTRUCTION MATERIALS

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E. DRILLING WELLS: NONE

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H. INJECTION WELLS: NONE

I. MONITORING/OBSERVATION WELLS: NONE

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THERE WILL BE NO CAMPS OR AIRSTRIPS.

10. WELL SITE LAYOUT

SURVEYED LOCATION PLAT. SEE EXHIBIT "B".

A. DRILLING PAD: SEE EXHIBIT "E"

B. LOCATION OF RIG EQUIPMENT AND FACILITIES: SEE EXHIBIT "F".

(1) RIG ORIENTATION: SEE EXHIBIT "F".

(2) ACCESS ROADS: SEE EXHIBITS "C".

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14. OPERATOR'S REPRESENTATION AND CERTIFICATION

OPERATOR'S FIELD REPRESENTATIVE:

DON BOWDEN
846 NORTH, 2500 WEST
VERNAL, UTAH 84078

HOME PHONE: (801) 789-2020

OPERATOR'S OFFICE REPRESENTATIVE:

NEAL LEAFDALE
800 W. WERNER CT
CASPER, WYOMING 82601

WORK PHONE (307) 266-3856

CERTIFICATION:

I HEREBY CERTIFY THAT I, OR PERSONS UNDER MY DIRECT SUPERVISION, HAVE INSPECTED THE PROPOSED DRILL SITE AND ACCESS ROUTE; THAT I AM FAMILIAR WITH THE CONDITIONS WHICH PRESENTLY EXIST; THAT THE STATEMENTS MADE IN THIS PLAN ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND CORRECT; AND THAT THE WORK ASSOCIATED WITH OPERATIONS PROPOSED HEREIN WILL BE PERFORMED BY AXEM RESOURCES INCORPORATED AND ITS CONTRACTORS AND SUBCONTRACTORS IN CONFORMITY WITH THIS PLAN ND THE TERMS AND CONDITIONS UNDER WHICH IT IS APPROVED. THIS STATEMENT IS SUBJECT TO THE PROVISIONS OF 18 U.S.C. 1001 FOR THE FILING OF A FALSE STATEMENT.

11/19/87
DATE

Kenneth J. DeFehr
KENNETH J. DEFEHR, P.E.
SENIOR PETROLEUM ENGINEER
AXEM RESOURCES INCORPORATED

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Norman H. Bangerter, Governor
Dee C. Hansen, Executive Director
Dianne R. Nielson, Ph.D., Division Director

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

November 25, 1987

Axem Resources Incorporated
7800 E. Union Avenue, Suite 1100
Denver, Colorado 80237

Gentlemen:

Re: Vernal 16-1 - SE SE Sec. 1, T. 5S, R. 21E - Uintah County, Utah
467' FSL, 475' FEL

Approval to drill the referenced well is hereby granted in accordance with Rule R615-3-2, Oil and Gas Conservation General Rules, subject to the following stipulations:

1. Prior to commencement of drilling, receipt by the Division of evidence providing assurance of an adequate and approved supply of water as required by Chapter 3, Title 73, Utah Code Annotated.

2. The operator shall contact the Division of Oil, Gas and Mining inspector Carol Kubly in Vernal, phone 789-1388, after excavation of reserve pit and prior to placing fluids in the pit to determine liner requirements.

In addition, the following actions are necessary to fully comply with this approval:

1. Spudding notification to the Division within 24 hours after drilling operations commence.

2. Submittal of an Entity Action Form to the Division within five working days of the time that the well is spudded or a change in operations or interests necessitates a change in entity status.

3. Submittal to the Division of completed Form OGC-8-X, Report of Water Encountered During Drilling.

4. Prompt notification to the Division should you determine that it is necessary to plug and abandon this well. Notify John R. Baza, Petroleum Engineer, (Office) (801) 538-5340, (Home) 298-7695, or R. J. Firth, Associate Director, (Home) 571-6068.

5. Compliance with the requirements of Rule R615-3-22, Gas Flaring or Venting, Oil and Gas Conservation General Rules.

6. Prior to commencement of the proposed drilling operations, plans for toilet facilities and the disposal of sanitary waste at the drill site shall be submitted to the local health department having jurisdiction. Any such drilling operations and any subsequent well operations must be conducted in accordance with applicable state and local health department regulations. A list of all local health departments and copies of applicable regulations are available from the Division of Environmental Health, Bureau of General Sanitation, telephone (801) 538-6121.

7. This approval shall expire one (1) year after date of issuance unless substantial and continuous operation is underway or an application for an extension is made prior to the approval expiration date.

The API number assigned to this well is 43-047-31825.

Sincerely,

R. J. Firth
Associate Director, Oil & Gas

as
Enclosures
cc: Branch of Fluid Minerals
D. R. Nielson
8159T

116 State Capitol Building
Salt Lake City, UT 84114
Telephone 801-533-5245

office of planning and budget

Norman H. Bangerter, Governor Dale C. Hatch, C.P.A., J.D., Director Michael E. Christensen, Ph.D., Deputy Director

December 2, 1987

John Baza
Division of Oil, Gas and Mining
3 Triad Center, Suite 350
355 West North Temple
Salt Lake City, Utah 84180-1203

SUBJECT: Axem Resources, Inc. Application for Permit to Drill a Wildcat Well, the Vernal #16-1, on a private lease, Uintah County State Application Identifier #UT871119-020

Dear John:

The Resource Development Coordinating Committee of the State of Utah has reviewed this proposed action and no comments have been indicated.

The Committee appreciates the opportunity of reviewing this document. Please address any other questions regarding this correspondence to Carolyn Wright (801) 538-1535.

Sincerely,

Michael E. Christensen

Michael E. Christensen
Deputy Director

DCH/jw

121113
NORMAN H. BANGERTER
GOVERNOR

STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT

Division of
State History
(UTAH STATE HISTORICAL SOCIETY)

MAX J. EVANS, DIRECTOR
300 RIO GRANDE
SALT LAKE CITY, UTAH 84101-1182
TELEPHONE 801/533-5755

December 3, 1987

John Baza
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dril.
43-047-31825
Axem Resources
Sec. 1, T5S, R21E, Uintah Co.

RE: Vernal 16-1 Well, UT871119-020

In Reply Please Refer to Case No. K622

Dear Mr. Baza:

The Utah State Historic Preservation Office has received for comment the above referenced project. A review of the project area by our staff indicates that an historic survey has been conducted in the area. An archaeological survey of the area, however, has not been completed. The likelihood for identifying additional cultural resources in the project area is low. The Division of Oil, Gas and Mining can use this information in making further recommendations for the project.

The above is provided on request as outlined by 36 CFR 800 or Utah Code, Title 63-18-37. If you have questions or need additional assistance, please contact David Schirer at (801) 533-7039.

Sincerely,

for A. Kent Powell
Deputy State Historic
Preservation Officer

DLS:jrc:K622/4949V OR

cc: Chairperson, Resource Development Coordinating Committee, State Planning Office, 118 State Capitol, Salt Lake City, Utah 84114

Water Permit
45-5297
T-62988

DIVISION OF OIL, GAS AND MINING

121012

O.L.

SPUDDING INFORMATION API #43-047-31825

NAME OF COMPANY: AXEM RESOURCES

WELL NAME: VERNAL 16-1

SECTION SE SE 1 TOWNSHIP 5S RANGE 21E COUNTY UINTAH

DRILLING CONTRACTOR RIMROCK DRILLING

RIG # Olsen #7

SPUDDED: DATE 12-7-87

TIME 10:00 AM

HOW Rotary

DRILLING WILL COMMENCE

REPORTED BY Don Bowden

TELEPHONE #

DATE 12-7-87 SIGNED JT

121704 file

RECEIVED
DEC 10 1987
DIVISION OF
OIL, GAS & MINING

FILING FOR WATER IN THE STATE OF UTAH

Rec. by gr
Fee Rec. 30.00
Receipt # 23375
Microfilmed
Roll #

APPLICATION TO APPROPRIATE WATER

For the purpose of acquiring the right to use a portion of the unappropriated water of the State of Utah, application is hereby made to the State Engineer, based upon the following showing of facts, submitted in accordance with the requirements of the Laws of Utah.

WATER USER CLAIM NO. 45 - 5297

APPLICATION NO. T62988

RECEIVED
DEC 07 1987
WATER RIGHTS
SALT LAKE

1. **PRIORITY OF RIGHT:** December 4, 1987
   FILING DATE: December 4, 1987

2. **OWNER INFORMATION**
   Name: Glade Holmes
   Address: P.O. Box 876, Vernal, Utah, UT 84078
   The land is owned by the applicant(s).

3. **QUANTITY OF WATER:** 4.0 acre feet (Ac. Ft.)

4. **SOURCE:** Unnamed Wash **DRAINAGE:** Ashley Valley
   POINT(S) OF DIVERSION: **COUNTY:** Uintah
   (1) N. 1350 feet, W. 600 feet, from the SE Corner of Section 1, Township 5 S, Range 21 E, SLB&M
   COMMON DESCRIPTION: 3.0mi. SE of Vernal.

5. **NATURE AND PERIOD OF USE**
   Oil Exploration From December 4 to February 4.

Vernal 43-047-31825 16-1

6. **PURPOSE AND EXTENT OF USE**
   Oil Exploratio: Oil Exploration and completion of Axem Resource well in SESE Sec. 1 T5S R21

7. **PLACE OF USE**
   The water is used in all or parts of each of the following legal subdivisions.

TOWN	RANGE	SEC	North East Quarter				North West Quarter				South West Quarter				South East Quarter			
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼
5 S	21 E	1																X

All locations in Salt Lake Base and Meridian

EXPLANATORY

Appropriate

****

The applicant hereby acknowledges he/they are a citizen(s) of the United States or intends to become such a citizen.

****

The quantity of water sought to be appropriated is limited to that which can be beneficially used for the purpose herein described.

****

The undersigned hereby acknowledges that even though he/they may have been assisted in the preparation of the above-numbered application through the courtesy of the employees of the Division of Water Rights, all responsibility for the accuracy of the information contained therein, at the time of filing, rests with the applicant(s).

Gladys Holmes
Signature of Applicant

STATE ENGINEER'S ENDORSEMENT

WATER RIGHT NUMBER: 45 - 5297 APPLICATION NO. T62988

1. December 4, 1987 Application received by JW.

2. December 4, 1987 Application designated for APPROVAL by RWL and KLJ.

3. Comments:

Conditions:
This application is hereby APPROVED, dated December 9, 1987, subject to prior rights and this application will expire on December 9, 1988.

Robert L. Morgan, P.E.
State Engineer

Uintah BASIN
ASSOCIATION OF GOVERNMENTS
120 South 100 East • Box 43-4 • Roosevelt, Utah 84066 • Phone: (801) 722-4518

122909

AREAWIDE CLEARINGHOUSE A-95 REVIEW

1401 07

NOI__ Preapp__ App$_{XX}$ State Plan__ State Action __ Subdivision__ (ASP#_____)

Other (indicate)_____ SAI Number_____

Applicant (Address, Phone Number):

OIL, GAS AND MINING
355 West North Temple
3 Triad Center, Suite 350
SLC, Ut 84180-1203

Federal Funds Requested: N/A

Dril.
43-047-31825

Title:

Application for Permit to Drill

Axem Resources Inc.
Vernal # 16-1
Sec. 1, T.5S, R.21E
Uintah Co.

- [X] No Comment
- [ ] See Comments below
- [ ] No action taken because of insufficient information
- [ ] Please send your formal application to us to review.
- [ ] Your attendance is requested

The applicant should forward any written review comments to the funding agency. Any written response to those comments should be forwarded to the State Clearinghouse and also to the funding agency.

Comments:

Copy mailed to Carolyn Wright, Grant Coordinator, 116 State Capitol SLC UT 84114

Jeannine Robles
Authorizing Official

12/23/87
Date

Axem Resources - Don Bowden
Ph. 789-2020

Vernal # 16-1 well
Sec. 1, T5S, R21E
Uintah Co.

Plugging instructions given @ 1:21 pm, 1-19-88
by J. Baza.

TD @ 7510' in Weber

Weber top @ ~ 7400'
Phosphoria @ 7236'
Other formations are ~ 70' deeper than prognosis.

Plugs:

(1) TD - 7300'.
(2) 100' plug @ top of Chinle
(3) 100' plug @ top of Frontier.
(4) 25 sx surface plug
(5) P & A marker unless landowner requests none.

Form OGC-1b

SUBMIT IN TRIPLICATE* (other instructions on reverse side)

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

RECEIVED
JAN 06 1988
DIVISION OF OIL, GAS & MINING

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. LEASE DESIGNATION AND SERIAL NO.: Holmes - Fee

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: 011103

1. OIL WELL [XX] GAS WELL [ ] OTHER

7. UNIT AGREEMENT NAME: Drl.

2. NAME OF OPERATOR: Axem Resources Incorporated

8. FARM OR LEASE NAME: Vernal

3. ADDRESS OF OPERATOR: 7800 E. Union Ave., Suite 1100, Denver, Colorado 80237

9. WELL NO.: 16-1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 867' FSL, 475' FEL SESE

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 1, T5S-R21E

14. PERMIT NO.: 43-047-31825

15. ELEVATIONS (Show whether DF, RT, GR, etc.): 5,279' GR

12. COUNTY OR PARISH: Uintah

13. STATE: Utah

16. **Check Appropnate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	[ ]	PULL OR ALTER CASING	[ ]	WATER SHUT-OFF	[ ]	REPAIRING WELL	[ ]
FRACTURE TREAT	[ ]	MULTIPLE COMPLETE	[ ]	FRACTURE TREATMENT	[ ]	ALTERING CASING	[ ]
SHOOT OR ACIDIZE	[ ]	ABANDON*	[ ]	SHOOTING OR ACIDIZING	[ ]	ABANDONMENT*	[ ]
REPAIR WELL	[ ]	CHANGE PLANS	[ ]	(Other)			[ ]
(Other) Monthly operations			[XX]	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

Spudded well 12-07-87,

Drilled surface hole with 12-1/4" bit to 382'. Set surface casing with 8-5/8", 24#, J-55 LT&C. Cemented casing with 265 sacks standard cement, 15.6 Density.

Currently drilling at 5,930' as of December 31. Drilling in the Navajo formation. Drilling with 7-7/8" bit.

18. I hereby certify that the foregoing is true and correct

SIGNED Shari L. Janata TITLE Senior Technician DATE 01-04-87

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form OGC-1b

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

5. LEASE DESIGNATION AND SERIAL NO.: Holmes - Fee

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

RECEIVED
JAN 06 1988
DIVISION OF OIL, GAS & MINING

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

1. OIL WELL [XX] GAS WELL [ ] OTHER

7. UNIT AGREEMENT NAME: N/A

2. NAME OF OPERATOR: Axem Resources Incorporated

8. FARM OR LEASE NAME: Vernal

3. ADDRESS OF OPERATOR: 7800 E. Union Ave., Suite 1100, Denver, Colorado 80237

9. WELL NO.: 16-1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 567' FSL, 475' FEL SESE

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 1, T5S-R21E

14. PERMIT NO.: 43-047-31825

15. ELEVATIONS (Show whether DF, RT, GR, etc.): 5,279' GR

12. COUNTY OR PARISH: Uintah

13. STATE: Utah

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	[ ]	PULL OR ALTER CASING	[ ]	WATER SHUT-OFF	[ ]	REPAIRING WELL	[ ]
FRACTURE TREAT	[ ]	MULTIPLE COMPLETE	[ ]	FRACTURE TREATMENT	[ ]	ALTERING CASING	[ ]
SHOOT OR ACIDIZE	[ ]	ABANDON*	[ ]	SHOOTING OR ACIDIZING	[ ]	ABANDONMENT*	[ ]
REPAIR WELL	[ ]	CHANGE PLANS	[ ]	(Other)			[ ]
(Other) Monthly operations			[XX]				

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

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Drilled surface hole with 12-1/4" bit to 382'. Set surface casing with 8-5/8", 24#, J-55 LT&C. Cemented casing with 265 sacks standard cement, 15.6 Density.

Currently drilling at 5,930' as of December 31. Drilling in the Navajo formation. Drilling with 7-7/8" bit.

18. I hereby certify that the foregoing is true and correct

SIGNED Shari L. Janata TITLE Senior Technician DATE 01-04-87

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

well file

Dr.

43-047-31825

DRILLING LOCATION ASSESSMENT
State of Utah
Division of Oil, Gas & Mining

120909

OPERATOR: Axem Resources Inc. WELL NAME: Vernal #16-1

QTR/QTR: SESE SECTION: 1 TWP: 5 South RANGE: 21 East

COUNTY: Uintah FIELD: Wildcat 467' F S L 475' F E L

SFC OWNER: Glade Holmes FEE LEASE #:

SPACING: F SECTION LINE F QTR/QTR LINE F ANOTHER WELL

INSPECTOR: Carol Kubly DATE & TIME: 24 & 25 November 87 1:30 p.m.

PARTICIPANTS: Don Bowden W/ Axem Resources, Glade Holmes - land owner and w/ Ouray Construction , Ernie Biust w/ Ouray Construction.

REGIONAL SETTING/TOPOGRAPHY: Colorado Plateau, Uintah Basin, Ashley Valley

LAND USE

CURRENT SURFACE USE: Alfalfa Field

PROPOSED SURFACE DISTURBANCE: 325' x 195' for location. 100' for access road.

AFFECTED FLOODPLAINS AND/OR WETLANDS: Not applicable

FLORA/FAUNA: stubble field from alfalfa

ENVIRONMENTAL PARAMETERS

GEOLOGY

SOIL TYPE AND CHARACTERISTICS: medium brown sandy loam

SURFACE FORMATION & CHARACTERISTICS: n/a

EROSION/SEDIMENTATION/STABILITY: Stable

SUBSURFACE GEOLOGY

OBJECTIVE(S)/DEPTH(S): Weber Formation at 7500'

ABNORMAL PRESSURES - HIGH AND LOW: No abnormal pressures. Possible deviated hole problems

CULTURAL RESOURCES/ARCHAEOLOGY: waived

WATER RESOURCES: Small intermittent drainage .2 mile north of location.

RESERVE PIT

CHARACTERISTICS: 60' x 100' x 6' predominantely lying in cut.

LINING: 13 mil plastic is required.

MUD PROGRAM: Freshwater / gel / KCl

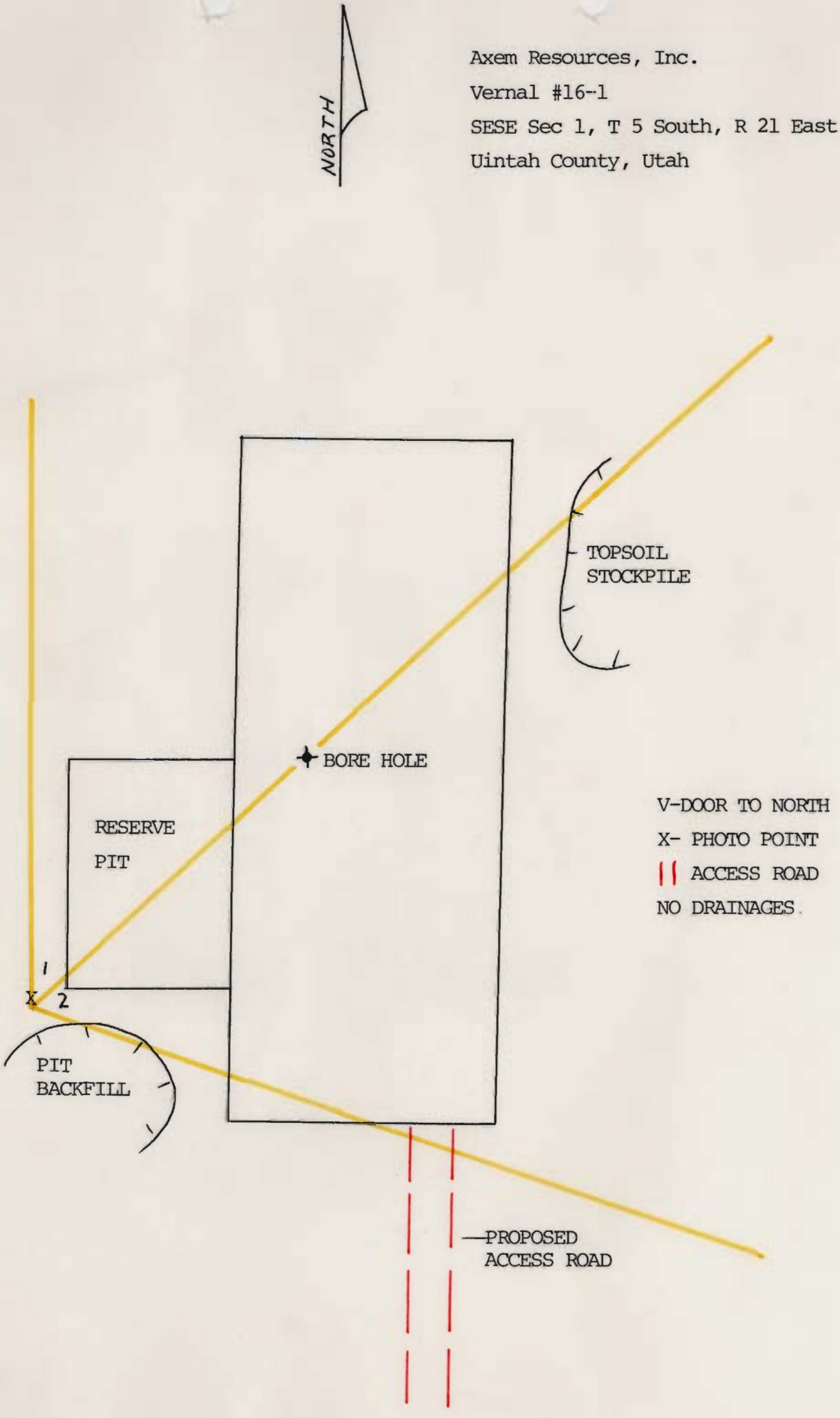
DRILLING WATER SUPPLY: Irrigation water well on location.

OTHER OBSERVATIONS: Topsoil and backfill stockpiles as noted on location schemata Entire location to be fenced.

STIPULATIONS FOR APD APPROVAL: Contact Carol Kubly at 801-789-1388 to verify pit lining integrity before hauling water to pit.

ATTACHMENTS

Axem Resources, Inc.
Vernal #16-1
SESE Sec 1, T 5 South, R 21 East
Uintah County, Utah



Form OGC-1b

SUBMIT IN TRIPLICATE* (other instructions on reverse side)

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

5. LEASE DESIGNATION AND SERIAL NO.: Holmes-Fee Orl.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

RECEIVED
JAN 26 1988
DIVISION OF OIL, GAS & MINING

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

1. OIL WELL ☐ GAS WELL ☐ OTHER DRY

7. UNIT AGREEMENT NAME:

2. NAME OF OPERATOR: AXEM RESOURCES INCORPORATED

8. FARM OR LEASE NAME: Vernal

3. ADDRESS OF OPERATOR: 7800 E. Union Ave., Suite 1100, Denver, Colorado 80237

9. WELL NO.: 16-1

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 467'FSL, 475'FEL SE SE

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 1, T5S-R21E

14. PERMIT NO.: 43-047-31825

15. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 5279'

12. COUNTY OR PARISH: Unitah

13. STATE: Utah

16. **Check Appropnate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	XX	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	☐
REPAIR WELL	☐	CHANGE PLANS	☐	(Other)			☐
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Well drilled to a total depth of 7520' and was found to be uncommercial. Plugging instructions received from Carol Kubly, Utah State inspector. Plugs to be set as follows:

#1	7497' - 7303'	55 SX
#2	6237' - 6137'	35 SX
#3	3635' - 3535'	35 SX
#4	392'	25 SX
#5	Surface	10 sx

18. I hereby certify that the foregoing is true and correct

KJD SIGNED Shari L. Janata (Shari L. Janata) TITLE Senior Technician DATE 1-19-88

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

APPROVED BY THE STATE OF UTAH DIVISION OF OIL, GAS, AND MINING
DATE: 2-1-88
BY: John R. Baza

*See Instructions on Reverse Side

FILE IN TRIPLICATE
FORM OGC-8-X

020407

56 64 03

RECEIVED
JAN 26 1988

DIVISION OF
OIL, GAS & MINING

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1588 West North Temple
Salt Lake City, Utah 84116

REPORT OF WATER ENCOUNTERED DURING DRILLING

Well Name & Number Vernal #16-1 43-047-31825

Operator AXEM RESOUCRES INCORPORATED Address 7800 E. Union Ave. #1100, Denver, CO 80237

Contractor Olsen Drilling Address 999-18th St., #3300, Denver, Co 8020

Location SE ¼ SE ¼ Sec. 1 T. 5S R. 21E County Uintah

Water Sands

	Depth		Volume	Quality
	From	To	Flow Rate or Head	Fresh or Salty
1.	7394'	7419	recovered 1563 feet	black water
2.				
3.				
4.				
5.				

(Continue of reverse side if necessary)

Formation Tops

Remarks

These figures were discovered when we drill stem tested the well.

NOTE: (a) Report on this form as provided for in Rule C-20, General Rules and Regulations and Rules of Practice and Procedure.

(b) If a water analysis has been made of the above reported zone, please forward a copy along with this form.

FILE IN TRIPLICATE
FORM OGC-8-X

56 64 03

RECEIVED
JAN 26 1988
DIVISION OF
OIL, GAS & MINING

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1588 West North Temple
Salt Lake City, Utah 84116

REPORT OF WATER ENCOUNTERED DURING DRILLING

Well Name & Number Vernal #16-1 43-047-31825

Operator AXEM RESOUCRES INCORPORATED Address 7800 E. Union Ave. #1100, Denver, CO 80237

Contractor Olsen Drilling Address 999-18th St., #3300, Denver, Co 8020

Location SE ¼ SE ¼ Sec. 1 T. 5S R. 21E County Uintah

Water Sands

	Depth		Volume	Quality
	From	To	Flow Rate or Head	Fresh or Salty
1.	7394'	7419	recovered 1563 feet	black water
2.				
3.				
4.				
5.				

(Continue of reverse side if necessary)

Formation Tops

Remarks

These figures were discovered when we drill stem tested the well.

NOTE: (a) Report on this form as provided for in Rule C-20, General Rules and Regulations and Rules of Practice and Procedure.

(b) If a water analysis has been made of the above reported zone, please forward a copy along with this form.

REPORT NO. 107326
PAGE NO. 1

TEST DATE:
17-JAN-88

WELL PERFORMANCE TESTING™ REPORT

020407

A Production System Analysis (NODAL™)
Based On Model Verified™ Interpretation

FLOPETROL JOHNSTON
Schlumberger

RECEIVED
JAN 27 1988

DIVISION OF OIL, GAS & MINING

Company: AXEM RESOURCES

Well: VERNAL #16-1

TEST IDENTIFICATION

Test Type	MFE OH DST
Test No.	1
Formation	WEBER
Test Interval (ft)	7394 - 7419
Reference Depth	KELLY BUSHING

WELL LOCATION

Field	
County	UINTAH
State	UTAH
Sec/Twn/Rng	S1T5SR21E
Elevation (ft)	5290

HOLE CONDITIONS

Total Depth (MD/TVD) (ft)	7419 / 7419
Hole Size (in)	7 7/8
Casing/Liner I.D. (in)	
Perf'd Interval/Net Pay (ft)	-- / 8
Shot Density/Diameter (in)	

MUD PROPERTIES

Mud Type	LSND
Mud Weight (lb/gal)	9.0
Mud Resistivity (ohm.m)	1.3 @ 60 DEG. F
Filtrate Resistivity (ohm.m)	1.2 @ 60 DEG. F
Filtrate Chlorides (ppm)	600

INITIAL TEST CONDITIONS

Initial Hydrostatic (psi)	3668
Gas Cushion Type	NONE
Surface Pressure (psi)	--
Liquid Cushion Type	NONE
Cushion Length (ft)	--

TEST STRING CONFIGURATION

Pipe Length (ft)/I.D. (in)	6726 / 2.75
Collar Length (ft)/I.D. (in)	617 / 2.25
Packer Depths (ft)	7394
Bottomhole Choke Size (in)	15/16
Gauge Depth (ft)/Type	7400/MECHANICAL

NET PIPE RECOVERY

Volume	Fluid Type	Properties
558 FT.	WC MUD	(TRACE OF OIL)
		RW 1.6 @ 60 DEG. F.
		400 PPM CL.
1218 FT.	WATER	RW 10 @ 60 D 90 PPM

NET SAMPLE CHAMBER RECOVERY

Volume	Fluid Type	Properties
2500 CC	WATER	RW 10 @ 60 DEG. F.
		90 PPM CL.
Pressure: 40	GOR:	GLR:

INTERPRETATION RESULTS

Model of Behavior	
Fluid Type Used for Analysis	
Reservoir Pressure (psi)	
Transmissibility (md.ft/cp)	
Effective Permeability (md)	
Skin Factor/Damage Ratio	
Storativity Ratio	
Interporosity Flow Coeff.	
Distance to an Anomaly (ft)	
Radius of Investigation (ft)	
Potentiometric Surface (ft)	

ROCK/FLUID/WELLBORE PROPERTIES

Oil Density (deg. API)	
Basic Solids (%)	
Gas Gravity	
Water Cut (%)	100
Viscosity (cp)	
Total Compressibility (1/psi)	
Porosity (%)	9
Reservoir Temperature (F)	130
Form.Vol.Factor (bbl/STB)	

PRODUCTION RATE DURING TEST: -

COMMENTS:

REPORT NO.
107326

PAGE NO. 2

SEQUENCE OF EVENTS

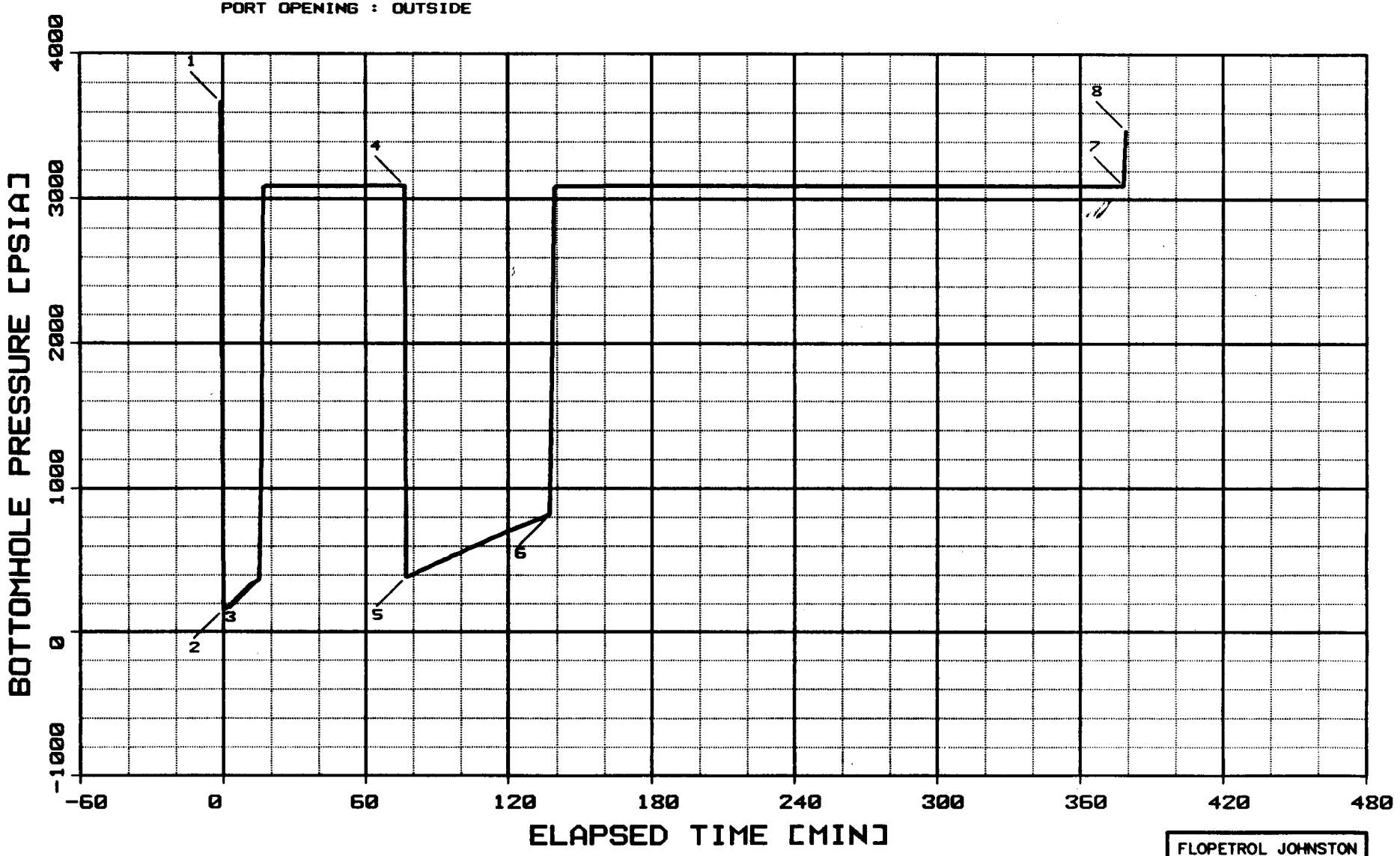
FLOPETROL JOHNSTON
Schlumberger

EVENT NO.	DATE	TIME (HR:MIN)	DESCRIPTION	ELAPSED TIME (MINS)	BHP (PSIA)	WHP (PSIG)
1	1-17-88	0020	SET PACKERS	-1.00	3668	
2		0024	OPENED TOOL-1/4"BUBBLHOSE	0.00	155	1/4" BLOW
		0029				4" BLOW
		0034				8" BLOW
3		0039	CLOSED FOR INITIAL SHUTIN	15.00	370	10.5"BLOW
4		0139	FINISHED SHUT-IN	76.50	3090	
5		0142	RE-OPENED TOOL	77.00	386	1/8" BLOW
		0152				7" BLOW
		0202				10" BLOW
		0212				16" BLOW
		0222				0.5 PSIG
		0232				0.5 PSIG
6		0242	CLOSED FOR FINAL SHUT-IN	137.00	817	0.5 PSIG
7		0642	FINISHED SHUT-IN	378.00	3091	
8		0647	PULLED PACKERS LOOSE	379.00	3472	
			DID NOT REVERSE OUT.			

BOTTOMHOLE PRESSURE LOG

FIELD REPORT NO. 107326
INSTRUMENT NO. J-216
DEPTH : 7400 FT
CAPACITY : 6400 PSI
PORT OPENING : OUTSIDE

COMPANY : AXEM RESOURCES
WELL : VERNAL #16-1



FLOPETROL JOHNSTON
Schlumberger

* WELL TEST DATA PRINTOUT *

FIELD REPORT # : 107326

COMPANY : AXEM RESOURCES
WELL : VERNAL #16-1

INSTRUMENT # : J-216
CAPACITY [PSI] : 6400.
DEPTH [FT] : 7400.0
PORT OPENING : OUTSIDE
TEMPERATURE [DEG F] : 130.0

LABEL POINT INFORMATION

#	TIME OF DAY HH:MM:SS	DATE DD-MM	EXPLANATION	ELAPSED TIME,MIN	BOT HOLE PRESSURE PSIA
1	0:23: 0	17-JA	HYDROSTATIC MUD	-1.00	3668
2	0:24: 0	17-JA	START FLOW	0.00	155
3	0:39: 0	17-JA	END FLOW & START SHUT-IN	15.00	370
4	1:40:30	17-JA	END SHUT-IN	76.50	3090
5	1:41: 0	17-JA	START FLOW	77.00	386
6	2:41: 0	17-JA	END FLOW & START SHUT-IN	137.00	817
7	6:42: 0	17-JA	END SHUT-IN	378.00	3091
8	6:43: 0	17-JA	HYDROSTATIC MUD	379.00	3472

SUMMARY OF FLOW PERIODS

PERIOD	START ELAPSED TIME,MIN	END ELAPSED TIME,MIN	DURATION MIN	START PRESSURE PSIA	END PRESSURE PSIA
1	0.00	15.00	15.00	155	370
2	77.00	137.00	60.00	386	817

SUMMARY OF SHUTIN PERIODS

PERIOD	START ELAPSED TIME,MIN	END ELAPSED TIME,MIN	DURATION MIN	START PRESSURE PSIA	END PRESSURE PSIA	FINAL FLOW PRESSURE PSIA	PRODUCING TIME, MIN
1	15.00	76.50	61.50	370	3090	370	15.00
2	137.00	378.00	241.00	817	3091	817	75.00

TEST PHASE : FLOW PERIOD # 1

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA
0:24: 0	17-JA	0.00	0.00	155
0:29: 0	17-JA	5.00	5.00	229
0:34: 0	17-JA	10.00	10.00	314
0:39: 0	17-JA	15.00	15.00	370

TEST PHASE : SHUTIN PERIOD # 1
FINAL FLOW PRESSURE [PSIA] = 370
PRODUCING TIME [MIN] = 15.00

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA	DELTA P PSI	LOG HORNER TIME
0:39: 0	17-JA	15.00	0.00	370	0	
0:40: 0	17-JA	16.00	1.00	1229	859	1.204
0:41: 0	17-JA	17.00	2.00	3076	2707	0.929
0:42: 0	17-JA	18.00	3.00	3089	2719	0.778
0:43: 0	17-JA	19.00	4.00	3089	2719	0.677
0:44: 0	17-JA	20.00	5.00	3089	2719	0.602
0:45: 0	17-JA	21.00	6.00	3089	2719	0.544
0:46: 0	17-JA	22.00	7.00	3089	2719	0.497
0:47: 0	17-JA	23.00	8.00	3089	2719	0.459
0:48: 0	17-JA	24.00	9.00	3089	2719	0.426
0:49: 0	17-JA	25.00	10.00	3089	2719	0.398
0:51: 0	17-JA	27.00	12.00	3089	2719	0.352
0:53: 0	17-JA	29.00	14.00	3089	2719	0.316
0:55: 0	17-JA	31.00	16.00	3089	2719	0.287
0:57: 0	17-JA	33.00	18.00	3089	2719	0.263
0:59: 0	17-JA	35.00	20.00	3089	2719	0.243
1: 1: 0	17-JA	37.00	22.00	3089	2719	0.226
1: 3: 0	17-JA	39.00	24.00	3089	2719	0.211
1: 5: 0	17-JA	41.00	26.00	3089	2719	0.198
1: 7: 0	17-JA	43.00	28.00	3089	2719	0.186
1: 9: 0	17-JA	45.00	30.00	3089	2719	0.176
1:14: 0	17-JA	50.00	35.00	3089	2719	0.155
1:19: 0	17-JA	55.00	40.00	3089	2719	0.138
1:24: 0	17-JA	60.00	45.00	3090	2720	0.125
1:29: 0	17-JA	65.00	50.00	3090	2721	0.114
1:34: 0	17-JA	70.00	55.00	3090	2721	0.105
1:39: 0	17-JA	75.00	60.00	3090	2721	0.097
1:40:30	17-JA	76.50	61.50	3090	2721	0.095

TEST PHASE : FLOW PERIOD # 2

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA
1:41: 0	17-JA	77.00	0.00	386
1:46: 0	17-JA	82.00	5.00	422
1:51: 0	17-JA	87.00	10.00	458
1:56: 0	17-JA	92.00	15.00	496
2: 1: 0	17-JA	97.00	20.00	534
2: 6: 0	17-JA	102.00	25.00	569
2:11: 0	17-JA	107.00	30.00	606
2:16: 0	17-JA	112.00	35.00	642
2:21: 0	17-JA	117.00	40.00	679
2:26: 0	17-JA	122.00	45.00	714
2:31: 0	17-JA	127.00	50.00	749
2:36: 0	17-JA	132.00	55.00	782
2:41: 0	17-JA	137.00	60.00	817

TEST PHASE : SHUTIN PERIOD # 2
FINAL FLOW PRESSURE [PSIA] = 817
PRODUCING TIME [MIN] = 75.00

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA	DELTA P PSI	LOG HORNER TIME
2:41: 0	17-JA	137.00	0.00	817	0	
2:42: 0	17-JA	138.00	1.00	1774	957	1.881
2:43: 0	17-JA	139.00	2.00	3075	2258	1.585
2:44: 0	17-JA	140.00	3.00	3089	2272	1.415
2:45: 0	17-JA	141.00	4.00	3089	2272	1.296
2:46: 0	17-JA	142.00	5.00	3089	2272	1.204
2:47: 0	17-JA	143.00	6.00	3089	2272	1.130
2:48: 0	17-JA	144.00	7.00	3089	2272	1.069
2:49: 0	17-JA	145.00	8.00	3089	2272	1.016
2:50: 0	17-JA	146.00	9.00	3089	2272	0.970
2:51: 0	17-JA	147.00	10.00	3089	2272	0.929
2:53: 0	17-JA	149.00	12.00	3089	2272	0.860
2:55: 0	17-JA	151.00	14.00	3089	2272	0.803
2:57: 0	17-JA	153.00	16.00	3089	2272	0.755
2:59: 0	17-JA	155.00	18.00	3089	2272	0.713
3: 1: 0	17-JA	157.00	20.00	3089	2272	0.677
3: 3: 0	17-JA	159.00	22.00	3089	2272	0.644
3: 5: 0	17-JA	161.00	24.00	3090	2273	0.615
3: 7: 0	17-JA	163.00	26.00	3090	2273	0.589
3: 9: 0	17-JA	165.00	28.00	3091	2274	0.566
3:11: 0	17-JA	167.00	30.00	3091	2275	0.544
3:16: 0	17-JA	172.00	35.00	3091	2275	0.497
3:21: 0	17-JA	177.00	40.00	3091	2275	0.459
3:26: 0	17-JA	182.00	45.00	3091	2275	0.426
3:31: 0	17-JA	187.00	50.00	3091	2275	0.398

TEST PHASE : SHUTIN PERIOD # 2
FINAL FLOW PRESSURE [PSIA] = 817
PRODUCING TIME [MIN] = 75.00

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA	DELTA P PSI	LOG HORNER TIME
3:36: 0	17-JA	192.00	55.00	3091	2275	0.374
3:41: 0	17-JA	197.00	60.00	3091	2275	0.352
3:46: 0	17-JA	202.00	65.00	3091	2275	0.333
3:51: 0	17-JA	207.00	70.00	3091	2275	0.316
3:56: 0	17-JA	212.00	75.00	3091	2275	0.301
4: 1: 0	17-JA	217.00	80.00	3091	2275	0.287
4: 6: 0	17-JA	222.00	85.00	3091	2275	0.275
4:11: 0	17-JA	227.00	90.00	3091	2275	0.263
4:16: 0	17-JA	232.00	95.00	3091	2275	0.253
4:21: 0	17-JA	237.00	100.00	3091	2275	0.243
4:26: 0	17-JA	242.00	105.00	3091	2275	0.234
4:31: 0	17-JA	247.00	110.00	3091	2275	0.226
4:36: 0	17-JA	252.00	115.00	3091	2275	0.218
4:41: 0	17-JA	257.00	120.00	3091	2275	0.211
4:46: 0	17-JA	262.00	125.00	3091	2275	0.204
4:51: 0	17-JA	267.00	130.00	3091	2275	0.198
4:56: 0	17-JA	272.00	135.00	3091	2275	0.192
5: 1: 0	17-JA	277.00	140.00	3091	2275	0.186
5: 6: 0	17-JA	282.00	145.00	3091	2275	0.181
5:11: 0	17-JA	287.00	150.00	3091	2275	0.176
5:16: 0	17-JA	292.00	155.00	3091	2275	0.171
5:21: 0	17-JA	297.00	160.00	3091	2275	0.167
5:26: 0	17-JA	302.00	165.00	3091	2275	0.163
5:31: 0	17-JA	307.00	170.00	3091	2275	0.159
5:36: 0	17-JA	312.00	175.00	3091	2275	0.155
5:41: 0	17-JA	317.00	180.00	3091	2275	0.151
5:46: 0	17-JA	322.00	185.00	3091	2275	0.148
5:51: 0	17-JA	327.00	190.00	3091	2275	0.144
5:56: 0	17-JA	332.00	195.00	3091	2275	0.141
6: 1: 0	17-JA	337.00	200.00	3091	2275	0.138
6: 6: 0	17-JA	342.00	205.00	3091	2275	0.135
6:11: 0	17-JA	347.00	210.00	3091	2275	0.133
6:16: 0	17-JA	352.00	215.00	3091	2275	0.130
6:21: 0	17-JA	357.00	220.00	3091	2275	0.127
6:26: 0	17-JA	362.00	225.00	3091	2275	0.125
6:31: 0	17-JA	367.00	230.00	3091	2275	0.123
6:36: 0	17-JA	372.00	235.00	3091	2275	0.120
6:41: 0	17-JA	377.00	240.00	3091	2275	0.118
6:42: 0	17-JA	378.00	241.00	3091	2275	0.118

FLOPETROL JOHNSTON
Schlumberger

920107

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SACRAMENTO, CA 95825
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JERRY CHAMBERS EXPLORATION CO
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800 WERNER COURT, SUITE 154
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SANTA FE, NM 87501
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WESTHOMA OIL CO.
1670 DENVER CLUB BLDG.
DENVER, CO 80202
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OTTO G. SEAL
4522 EAST 75TH STREET
TULSA, OK 74136
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BOULDER, CO 80301

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555 MADISON AVE.
NEW YORK, NY 10022

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PALMER EXPLORATION, LTD.
732 CHERRY ST.
DENVER, CO 80220

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WHITAKER OIL & GAS PROPERTIES
45 WEST WASHINGTON ST.
THE WHITAKER BLDG.
ORLANDO, FL 32801

1

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HERBST OIL & GAS, INC.
5585 S. BERRY LANE
ENGLEWOOD, CO 80111

1

X

STATE OF UTAH
DEPT. OF NATURAL RESOURCES
DIVISION OF OIL, GAS & MINING
3 TRIAD CENTER, SUITE 350
SALT LAKE CITY, UT 84180-1203

2

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LOCKARD & ROBBINS
1350 17TH ST., SUITE 200
DENVER, CO 80202

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CUSTOMER SAME	FIELD
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CHARLES DAVISDON
895 LAKE AVE.
GREENWICH, CN 06830

1

X

AMOCO PRODUCTION CO.
P. O. BOX 800
DENVER, CO 80202
ATTN: TOM DILL

1

X

X

X

Orl.
43-047-31825

REPORT NO. 107326
PAGE NO. 1

TEST DATE:
17-JAN-88

WELL PERFORMANCE TESTING™ REPORT 020407

A Production System Analysis (NODAL™)
Based On Model Verified™ Interpretation

FLOPETROL JOHNSTON
Schlumberger

RECEIVED
JAN 27 1988
DIVISION OF OIL, GAS & MINING

Company: AXEM RESOURCES

Well: VERNAL #16-1

TEST IDENTIFICATION

Test Type	MFE OH DST
Test No.	1
Formation	WEBER
Test Interval (ft)	7394 - 7419
Reference Depth	KELLY BUSHING

WELL LOCATION

Field	
County	UINTAH
State	UTAH
Sec/Twn/Rng	S1T5SR21E
Elevation (ft)	5290

HOLE CONDITIONS

Total Depth (MD/TVD) (ft)	7419 / 7419
Hole Size (in)	7 7/8
Casing/Liner I.D. (in)	
Perf'd Interval/Net Pay (ft)	-- / 8
Shot Density/Diameter (in)	

MUD PROPERTIES

Mud Type	LSND
Mud Weight (lb/gal)	9.0
Mud Resistivity (ohm.m)	1.3 @ 60 DEG. F
Filtrate Resistivity (ohm.m)	1.2 @ 60 DEG. F
Filtrate Chlorides (ppm)	600

INITIAL TEST CONDITIONS

Initial Hydrostatic (psi)	3668
Gas Cushion Type	NONE
Surface Pressure (psi)	--
Liquid Cushion Type	NONE
Cushion Length (ft)	--

TEST STRING CONFIGURATION

Pipe Length (ft)/I.D. (in)	6726 / 2.75
Collar Length (ft)/I.D. (in)	617 / 2.25
Packer Depths (ft)	7394
Bottomhole Choke Size (in)	15/16
Gauge Depth (ft)/Type	7400/MECHANICAL

NET PIPE RECOVERY

Volume	Fluid Type	Properties
558 FT.	WC MUD	(TRACE OF OIL)
		RW 1.6 @ 60 DEG. F.
		400 PPM CL.
1218 FT.	WATER	RW 10 @ 60 D 90 PPM

NET SAMPLE CHAMBER RECOVERY

Volume	Fluid Type	Properties
2500 CC	WATER	RW 10 @ 60 DEG. F.
		90 PPM CL.
Pressure: 40	GOR:	GLR:

INTERPRETATION RESULTS

Model of Behavior	
Fluid Type Used for Analysis	
Reservoir Pressure (psi)	
Transmissibility (md.ft/cp)	
Effective Permeability (md)	
Skin Factor/Damage Ratio	
Storativity Ratio	
Interporosity Flow Coeff.	
Distance to an Anomaly (ft)	
Radius of Investigation (ft)	
Potentiometric Surface (ft)	

ROCK/FLUID/WELLBORE PROPERTIES

Oil Density (deg. API)	
Basic Solids (%)	
Gas Gravity	
Water Cut (%)	100
Viscosity (cp)	
Total Compressibility (1/psi)	
Porosity (%)	9
Reservoir Temperature (F)	130
Form.Vol.Factor (bbl/STB)	

PRODUCTION RATE DURING TEST: -

COMMENTS:

REPORT NO.
107326

PAGE NO. 2

SEQUENCE OF EVENTS

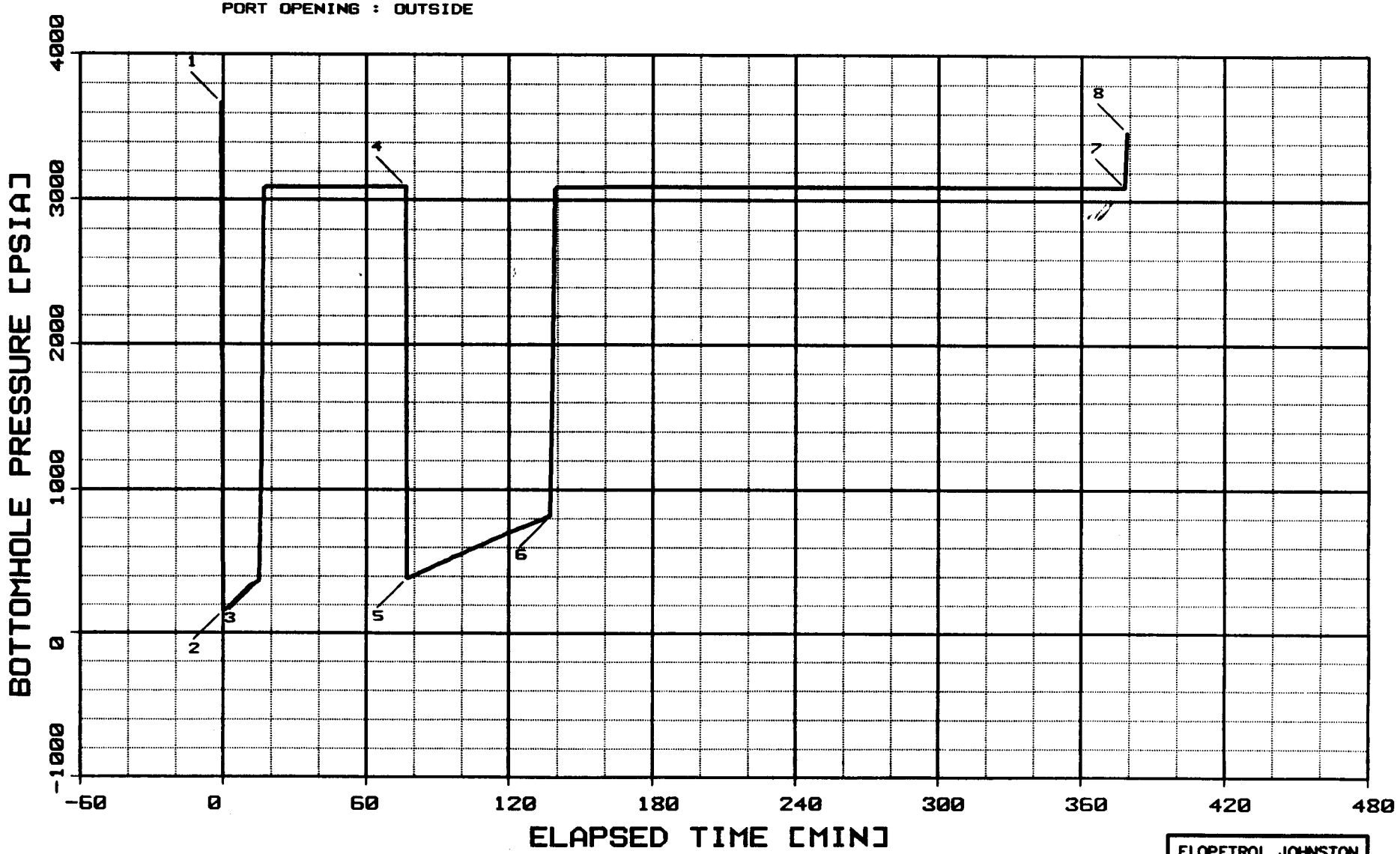
FLOPETROL JOHNSTON
Schlumberger

EVENT NO.	DATE	TIME (HR:MIN)	DESCRIPTION	ELAPSED TIME (MINS)	BHP (PSIA)	WHP (PSIG)
1	1-17-88	0020	SET PACKERS	-1.00	3668	
2		0024	OPENED TOOL-1/4"BUBBLHOSE	0.00	155	1/4" BLOW
		0029				4" BLOW
		0034				8" BLOW
3		0039	CLOSED FOR INITIAL SHUTIN	15.00	370	10.5"BLOW
4		0139	FINISHED SHUT-IN	76.50	3090	
5		0142	RE-OPENED TOOL	77.00	386	1/8" BLOW
		0152				7" BLOW
		0202				10" BLOW
		0212				16" BLOW
		0222				0.5 PSIG
		0232				0.5 PSIG
6		0242	CLOSED FOR FINAL SHUT-IN	137.00	817	0.5 PSIG
7		0642	FINISHED SHUT-IN	378.00	3091	
8		0647	PULLED PACKERS LOOSE	379.00	3472	
			DID NOT REVERSE OUT.			

BOTTOMHOLE PRESSURE LOG

FIELD REPORT NO. 107326
INSTRUMENT NO. J-216
DEPTH : 7400 FT
CAPACITY : 6400 PSI
PORT OPENING : OUTSIDE

COMPANY : AXEM RESOURCES
WELL : VERNAL #16-1



FLOPETROL JOHNSTON
Schlumberger

WELL TEST DATA PRINTOUT

FIELD REPORT # : 107326

COMPANY : AXEM RESOURCES
WELL : VERNAL #16-1

INSTRUMENT # : J-216
CAPACITY [PSI] : 6400.
DEPTH [FT] : 7400.0
PORT OPENING : OUTSIDE
TEMPERATURE [DEG F] : 130.0

LABEL POINT INFORMATION

#	TIME OF DAY HH:MM:SS	DATE DD-MM	EXPLANATION	ELAPSED TIME,MIN	BOT HOLE PRESSURE PSIA
1	0:23: 0	17-JA	HYDROSTATIC MUD	-1.00	3668
2	0:24: 0	17-JA	START FLOW	0.00	155
3	0:39: 0	17-JA	END FLOW & START SHUT-IN	15.00	370
4	1:40:30	17-JA	END SHUT-IN	76.50	3090
5	1:41: 0	17-JA	START FLOW	77.00	386
6	2:41: 0	17-JA	END FLOW & START SHUT-IN	137.00	817
7	6:42: 0	17-JA	END SHUT-IN	378.00	3091
8	6:43: 0	17-JA	HYDROSTATIC MUD	379.00	3472

SUMMARY OF FLOW PERIODS

PERIOD	START ELAPSED TIME,MIN	END ELAPSED TIME,MIN	DURATION MIN	START PRESSURE PSIA	END PRESSURE PSIA
1	0.00	15.00	15.00	155	370
2	77.00	137.00	60.00	386	817

SUMMARY OF SHUTIN PERIODS

PERIOD	START ELAPSED TIME,MIN	END ELAPSED TIME,MIN	DURATION MIN	START PRESSURE PSIA	END PRESSURE PSIA	FINAL FLOW PRESSURE PSIA	PRODUCING TIME, MIN
1	15.00	76.50	61.50	370	3090	370	15.00
2	137.00	378.00	241.00	817	3091	817	75.00

TEST PHASE : FLOW PERIOD # 1

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA
0:24: 0	17-JA	0.00	0.00	155
0:29: 0	17-JA	5.00	5.00	229
0:34: 0	17-JA	10.00	10.00	314
0:39: 0	17-JA	15.00	15.00	370

TEST PHASE : SHUTIN PERIOD # 1
FINAL FLOW PRESSURE [PSIA] = 370
PRODUCING TIME [MIN] = 15.00

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA	DELTA P PSI	LOG HORNER TIME
0:39: 0	17-JA	15.00	0.00	370	0	
0:40: 0	17-JA	16.00	1.00	1229	859	1.204
0:41: 0	17-JA	17.00	2.00	3076	2707	0.929
0:42: 0	17-JA	18.00	3.00	3089	2719	0.778
0:43: 0	17-JA	19.00	4.00	3089	2719	0.677
0:44: 0	17-JA	20.00	5.00	3089	2719	0.602
0:45: 0	17-JA	21.00	6.00	3089	2719	0.544
0:46: 0	17-JA	22.00	7.00	3089	2719	0.497
0:47: 0	17-JA	23.00	8.00	3089	2719	0.459
0:48: 0	17-JA	24.00	9.00	3089	2719	0.426
0:49: 0	17-JA	25.00	10.00	3089	2719	0.398
0:51: 0	17-JA	27.00	12.00	3089	2719	0.352
0:53: 0	17-JA	29.00	14.00	3089	2719	0.316
0:55: 0	17-JA	31.00	16.00	3089	2719	0.287
0:57: 0	17-JA	33.00	18.00	3089	2719	0.263
0:59: 0	17-JA	35.00	20.00	3089	2719	0.243
1: 1: 0	17-JA	37.00	22.00	3089	2719	0.226
1: 3: 0	17-JA	39.00	24.00	3089	2719	0.211
1: 5: 0	17-JA	41.00	26.00	3089	2719	0.198
1: 7: 0	17-JA	43.00	28.00	3089	2719	0.186
1: 9: 0	17-JA	45.00	30.00	3089	2719	0.176
1:14: 0	17-JA	50.00	35.00	3089	2719	0.155
1:19: 0	17-JA	55.00	40.00	3089	2719	0.138
1:24: 0	17-JA	60.00	45.00	3090	2720	0.125
1:29: 0	17-JA	65.00	50.00	3090	2721	0.114
1:34: 0	17-JA	70.00	55.00	3090	2721	0.105
1:39: 0	17-JA	75.00	60.00	3090	2721	0.097
1:40:30	17-JA	76.50	61.50	3090	2721	0.095

TEST PHASE : SHUTIN PERIOD # 2
FINAL FLOW PRESSURE [PSIA] = 817
PRODUCING TIME [MIN] = 75.00

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA	DELTA P PSI	LOG HORNER TIME
3:36: 0	17-JA	192.00	55.00	3091	2275	0.374
3:41: 0	17-JA	197.00	60.00	3091	2275	0.352
3:46: 0	17-JA	202.00	65.00	3091	2275	0.333
3:51: 0	17-JA	207.00	70.00	3091	2275	0.316
3:56: 0	17-JA	212.00	75.00	3091	2275	0.301
4: 1: 0	17-JA	217.00	80.00	3091	2275	0.287
4: 6: 0	17-JA	222.00	85.00	3091	2275	0.275
4:11: 0	17-JA	227.00	90.00	3091	2275	0.263
4:16: 0	17-JA	232.00	95.00	3091	2275	0.253
4:21: 0	17-JA	237.00	100.00	3091	2275	0.243
4:26: 0	17-JA	242.00	105.00	3091	2275	0.234
4:31: 0	17-JA	247.00	110.00	3091	2275	0.226
4:36: 0	17-JA	252.00	115.00	3091	2275	0.218
4:41: 0	17-JA	257.00	120.00	3091	2275	0.211
4:46: 0	17-JA	262.00	125.00	3091	2275	0.204
4:51: 0	17-JA	267.00	130.00	3091	2275	0.198
4:56: 0	17-JA	272.00	135.00	3091	2275	0.192
5: 1: 0	17-JA	277.00	140.00	3091	2275	0.186
5: 6: 0	17-JA	282.00	145.00	3091	2275	0.181
5:11: 0	17-JA	287.00	150.00	3091	2275	0.176
5:16: 0	17-JA	292.00	155.00	3091	2275	0.171
5:21: 0	17-JA	297.00	160.00	3091	2275	0.167
5:26: 0	17-JA	302.00	165.00	3091	2275	0.163
5:31: 0	17-JA	307.00	170.00	3091	2275	0.159
5:36: 0	17-JA	312.00	175.00	3091	2275	0.155
5:41: 0	17-JA	317.00	180.00	3091	2275	0.151
5:46: 0	17-JA	322.00	185.00	3091	2275	0.148
5:51: 0	17-JA	327.00	190.00	3091	2275	0.144
5:56: 0	17-JA	332.00	195.00	3091	2275	0.141
6: 1: 0	17-JA	337.00	200.00	3091	2275	0.138
6: 6: 0	17-JA	342.00	205.00	3091	2275	0.135
6:11: 0	17-JA	347.00	210.00	3091	2275	0.133
6:16: 0	17-JA	352.00	215.00	3091	2275	0.130
6:21: 0	17-JA	357.00	220.00	3091	2275	0.127
6:26: 0	17-JA	362.00	225.00	3091	2275	0.125
6:31: 0	17-JA	367.00	230.00	3091	2275	0.123
6:36: 0	17-JA	372.00	235.00	3091	2275	0.120
6:41: 0	17-JA	377.00	240.00	3091	2275	0.118
6:42: 0	17-JA	378.00	241.00	3091	2275	0.118

TEST PHASE : FLOW PERIOD # 2

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA
1:41: 0	17-JA	77.00	0.00	386
1:46: 0	17-JA	82.00	5.00	422
1:51: 0	17-JA	87.00	10.00	458
1:56: 0	17-JA	92.00	15.00	496
2: 1: 0	17-JA	97.00	20.00	534
2: 6: 0	17-JA	102.00	25.00	569
2:11: 0	17-JA	107.00	30.00	606
2:16: 0	17-JA	112.00	35.00	642
2:21: 0	17-JA	117.00	40.00	679
2:26: 0	17-JA	122.00	45.00	714
2:31: 0	17-JA	127.00	50.00	749
2:36: 0	17-JA	132.00	55.00	782
2:41: 0	17-JA	137.00	60.00	817

TEST PHASE : SHUTIN PERIOD # 2
FINAL FLOW PRESSURE [PSIA] = 817
PRODUCING TIME [MIN] = 75.00

TIME OF DAY HH:MM:SS	DATE DD-MM	ELAPSED TIME,MIN	DELTA TIME,MIN	BOT HOLE PRESSURE PSIA	DELTA P PSI	LOG HORNER TIME
2:41: 0	17-JA	137.00	0.00	817	0	
2:42: 0	17-JA	138.00	1.00	1774	957	1.881
2:43: 0	17-JA	139.00	2.00	3075	2258	1.585
2:44: 0	17-JA	140.00	3.00	3089	2272	1.415
2:45: 0	17-JA	141.00	4.00	3089	2272	1.296
2:46: 0	17-JA	142.00	5.00	3089	2272	1.204
2:47: 0	17-JA	143.00	6.00	3089	2272	1.130
2:48: 0	17-JA	144.00	7.00	3089	2272	1.069
2:49: 0	17-JA	145.00	8.00	3089	2272	1.016
2:50: 0	17-JA	146.00	9.00	3089	2272	0.970
2:51: 0	17-JA	147.00	10.00	3089	2272	0.929
2:53: 0	17-JA	149.00	12.00	3089	2272	0.860
2:55: 0	17-JA	151.00	14.00	3089	2272	0.803
2:57: 0	17-JA	153.00	16.00	3089	2272	0.755
2:59: 0	17-JA	155.00	18.00	3089	2272	0.713
3: 1: 0	17-JA	157.00	20.00	3089	2272	0.677
3: 3: 0	17-JA	159.00	22.00	3089	2272	0.644
3: 5: 0	17-JA	161.00	24.00	3090	2273	0.615
3: 7: 0	17-JA	163.00	26.00	3090	2273	0.589
3: 9: 0	17-JA	165.00	28.00	3091	2274	0.566
3:11: 0	17-JA	167.00	30.00	3091	2275	0.544
3:16: 0	17-JA	172.00	35.00	3091	2275	0.497
3:21: 0	17-JA	177.00	40.00	3091	2275	0.459
3:26: 0	17-JA	182.00	45.00	3091	2275	0.426
3:31: 0	17-JA	187.00	50.00	3091	2275	0.398

DOGM Form 5
May 5, 1987

020407

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

RECEIVED
FEB 01 1988
DIVISION OF OIL, GAS & MINING

5. LEASE DESIGNATION AND SERIAL NO.: Holmes - Fee
6. IF INDIAN, ALLOTTEE OR TRIBE NAME:
7. UNIT AGREEMENT NAME:
8. FARM OR LEASE NAME: Vernal
9. WELL NO.: 16-1
10. FIELD AND POOL, OR WILDCAT: Wildcat
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 1, T5S-R21E
12. COUNTY OR PARISH: Uintah
13. STATE: Utah

1. OIL WELL ☐ GAS WELL ☐ OTHER: DRY
2. NAME OF OPERATOR: AXEM RESOURCES INCORPORATED
3. ADDRESS OF OPERATOR: 7800 E. Union Ave., Suite 1100, Denver, Colorado 80237
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.) At surface: 467'FSL, 475'FEL SE SE
14. API NUMBER: 43-047-31825
15. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 5279'

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
TEST WATER SHUT-OFF	☐	PULL OR ALTER CASING	☐	WATER SHUT-OFF	☐	REPAIRING WELL	☐
FRACTURE TREAT	☐	MULTIPLE COMPLETE	☐	FRACTURE TREATMENT	☐	ALTERING CASING	☐
SHOOT OR ACIDIZE	☐	ABANDON*	☐	SHOOTING OR ACIDIZING	☐	ABANDONMENT*	XX
REPAIR WELL	☐	CHANGE PLANS	☐	(Other)			☐
(Other)			☐	(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Well was plugged as follows:

#1	7497'-7303'	55 SXs	waited on plug for 3 hours. Plu tagged
#2	6237'-6137'	35 SXs	
#3	3635'-3535'	35 SXs	layed down drill pipe to set plug across surface
#4	392'	25 SXs	Carol Kubly witnessed tagging of first plug.
#5	surface	10 SXs	Released rig at 4:00 pm on 1-20-88.

18. I hereby certify that the foregoing is true and correct

KJD

SIGNED: Shari L. Janata TITLE: Senior Technician DATE: 1-22-88

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

APPROVED BY THE STATE OF UTAH DIVISION OF OIL, GAS, AND MINING
DATE: 2-2-88
BY: John R. Baza

*See Instructions on Reverse Side

Form OGC-3

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

56 64 01 16

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

RECEIVED
FEB 01 1988
DIVISION OF OIL, GAS & MINING

5. LEASE DESIGNATION AND SERIAL NO.: Holmes - Fee

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: 020406

7. UNIT AGREEMENT NAME:

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☐ DRY ☒ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

8. FARM OR LEASE NAME: Vernal

2. NAME OF OPERATOR: AXEM RESOURCES INCORPORATED

9. WELL NO.: 16-1

3. ADDRESS OF OPERATOR: 7800 E. Union Ave., Suite 1100, Denver, Colorado 80237

10. FIELD AND POOL, OR WILDCAT: Wildcat

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface 467'FSL, 475'FEL
At top prod. interval reported below Same
At total depth Same

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 1, T5S-R21E

14. PERMIT NO.	DATE ISSUED	12. COUNTY OR PARISH	13. STATE
43-047-31825	11-25-87	Uintah	Utah

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
12-7-87	1-19-88	well was plugged	Gr 5279'	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
7520'	---	0	→	0-7520'	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
Well was dry

25. WAS DIRECTIONAL SURVEY MADE: NO

26. TYPE ELECTRIC AND OTHER LOGS RUN
Dual Induction-SFL, Acoustic, CNDL, Density
1-21-88 STRATIGRAPHIC DIPMETER, BHC SONIC, LDT/CNT POROSITY, MUD LOG

27. WAS WELL CORED: Yes

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	384-63'	12-1/4"	265 Sx Standard Cement	0

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
N/A				

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)

31. PERFORATION RECORD (*Interval, size and number*)
N/A Plugging record on Sundry

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
N/A		

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Shari L. Janata TITLE Senior Technician DATE 1-22-88

Shari L. Janata

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Weber	7394	7419	DST - Times 15-60-60-240 IH 3636 FF 360-791 IF 157-322 FSI 3076 ISI 3075 FH 3456 Recovered 60' mud 180' mud & Water 1563' Black Water

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Frontier	3635'	Same
Dakota	4010'	"
Curtis	4957'	"
Entrada	5187'	"
Carmel	5334'	"
Navajo	5450'	"
Chinle	6236'	"
Shinarump	6450'	"
Moenkopi	6520'	"
Phosphoria	7218'	"
Weber	7376'	"

Dr.
43-047-31825

HOLE INFORMATION

020407

NAME: #16-1 Vernal
OPERATER: AXEM RESOURCES, INCORPORATED

LOCATION: SouthEast SouthEast Section 1
467' FSL X 475' FEL
Township 5 South, Range 21 East

Spud Date:	12-07-87
Total Depth Date:	01-19-88
Total Depth:	7520 (Rig), 7510 (E-log)
Ground Level Elevation:	5276'
Kelly Bushing Elevation:	5290'

Drilling Rig:	Win Rock-Olsen #7
Hole Size:	12 1/4", 7 7/8" (below surface)
Surface Casing:	380' of 8 5/8"
Mud Program:	Fresh Water/Low Solids/Non-Dispersed
Electrical Logs:	Gamma Ray Log (At Driller's Depth 7370) E-log Depth 7337 (See Hole History) TD to Surface (At minimum cost) Schlumberger, Mr. Jorgensen, Operator Dual Induction/Gamma Ray/Spontaneous Potential To surface casing BHC Sonic/Gamma Ray/Bulk Density To surface casing LDT/CNT Porosity/Bulk Density To Top Frontier Show (3890' E-log) Stratigraphic Dipmeter To Above Curtis Top (4850' E-log) Schlumberger, Mr. Voss, Operator

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Cores:

Core #1	7387-7393 (Strip Log) 7372-7378 (E-log)
Core #2	7393-7395.25 (Strip Log) 7379-7381.25 (E-log)
Core #3	7395.25-7409 (Strip Log) 7382-7396 (E-log)
Core #4	7409-7419 (Strip Log) 7396-7406 (E-log)

E-log depth gaps in core depths reflect adjustments due to 1) 3' of error at kelly down during coring, and 2) compensations made to washing down and "drilling slack off" factors

Reed Downdco, Mr. Gale, Core Hand

Drill Stem Test:

7381-7406 (E-log)
7394-7419 (Strip Log)

Formation(s):	Lowermost Phosphoria and Upper Weber
Times:	15-60-60-360 (See Drill Stem Test Section)
Result:	Test Mechanically Successful

Flopetrol Johnston, Mr. Richards, Technician

Rig Personalities:

Don Bowden	Company Man, Consultant for Axem
"Bob" Clayton Lafferty	Tool Pusher
Charles Callahan	Consultant Geologist (Axem)

TABLE OF CONTENTS

FORMATION AND OTHER PERTINENT TOPS

	E-log	Subsea	Strip Log
Base of Surface Casing	380	+4910	
Frontier	3635	+1655	3642
Frontier Show	3712	+1578	3718
Dakota	3990	+1300	4000
First Bench	4020	+1270	4030
Second Bench	4039	+1251	4046
Third Bench (Lakota)	4097	+1193	4100
Morrison	4103	+1187	4112
Curtis	4907	+ 383	4918
Entrada	5188	+ 102	5198
Carmel	5335	- 45	5346
Navaho	5441	- 151	5452
Chinle	6237	- 947	6252
Chinle Gas Show	6280	- 990	6292
Shinarump	6450	-1160	6450
Shinarump Conglomerate Show	6508	-1218	6520
Moenkopi	6519	-1229	6534
Phosphoria	7217	-1927	7227
Gamma Ray Logging Point	7352	-2062	7370
(See Core Section for apparent depth descrepancies)			
Weber	7375	-2085	7393
Core #1	7372-7378	-2082/-2088	7387/7393
Core #2	7379-7381+	-2089/-2091+	7393/7395+
Core #3	7382-7396	-2092/-2106	7395/7409
Core #4	7396-7406	-2106/-2116	7409/7419
Drill Stem Test	7381-7406	-2091/-2116	7394/7419
Total Depth	7510	-2220	7520

SHOW REPORTS

Refer to Plate #1

#1 Second Bench of the Frontier
3715-3752 Strip Log, 3710-3744 Electric Log

Reason: One of the secondary targets of the well. Regionally, the Frontier formation produces both oil and gas

Gas:	Before	During	After
Hotwire	5	12	5
C1	175ppm	380ppm	150ppm
C2	-	-	-
C3	-	-	-
C4	-	-	-

NOTE: Gas concentrated over 3713-3716 (E-log), with no heavies

Lithology:

Sandstone- clear to light grey to white, very fine to fine- with isolated slightly coarse, well to moderately well sorted, sub-angular to rounded, slightly frosted quartz grains in a calcic clay matrix. Coal fragments towards base, scattered disseminated pyrite zones associated with carbon (coal) streaks. Appears to be a series of silt to slightly coarse sequences with mobile calcic clays. Most often, the calcic clays are associated with finer, as well as, more poorly sorted components. Perhaps, a total of 10' of fair intergranular porosity scattered throughout the interval. Very isolated mineral fluorescence, no significant cut, poor show

Refer to Plate #2

#1 Third Bench of the Dakota (Lakota)
4100-4107 Strip Log, 4096-4103 Electric Log

Reason: Not only was this the best show to this point in the well, but, in fact, the entire well. The show was circulated up at @ 4117 (Strip log)

Gas:	Before	During	After
Hotwire	1	14	1
C1	62ppm	440ppm	190ppm
C2	-	-	-
C3	-	-	(46ppm)*
C4	-	-	(87ppm)*

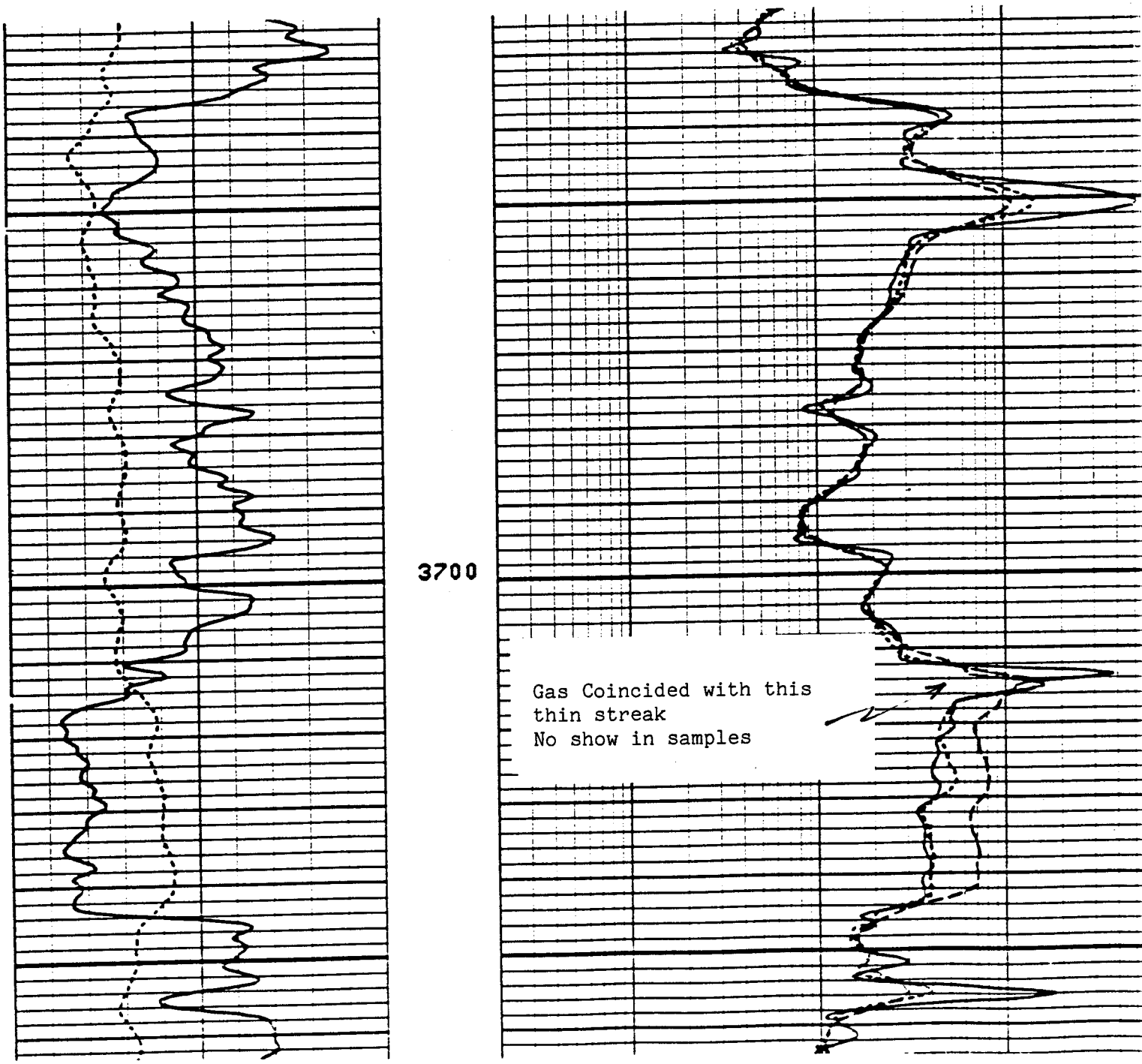

Plate #1

NOTE: As indicated by the '*', C3 and C4 were not detected simultaneous with C1. Instead, this zone produced a connection gas (which occurred during the drilling break) that had virtually no C1, no C2, and the C3-4 values as recorded above.

Lithology:

Sandstone- white to clear with thin buff streaks (5%)- seemed to get tanner as it dried, moderately coarse (90%) to coarse (10%), subangular, medium sorted, slightly to moderately frosted, quartz grains in a firm to very firm and brittle kaolinite (50%) to 50% silaceous matrix. Scattered thin streaks of montmorillinite. Appears to be streaks (without significant dead oil) of fair intergranular porosity in a tight sand. No apparent live oil or significant residual stain. Very strong yellow to canary yellow fluorescence, most of which was mineral (sample was retorted without any significant reduction in fluorescence). Perhaps .5 to 1% of the fluorescence may have been oil or gas. Yellow cloud cut and ring cut (wet) with trichlor.

Conclusions:

1. Seemed, at the circulation point (4117 strip log), to be on the borderline of being worth testing. The two factors tipping the scales against testing were: a) the spottiness of the porosity over the interval, and b) the preponderence of the kaolinite component

2. Electric logs revealed 3' of porosity, and, was deemed by all principal partners not worth straddle testing.

Refer to Plate #3

#1 Small Methane Kick in the Chinle
6292-6294 Strip Log 6280-6282 Electrical Log

Reason: Minor gas kick, which,in conjunction with the lithology, is barely worth noting

Gas:	Before	During	After
Hotwire	4	15	4
C1	150ppm	350ppm	100ppm
C2	-	-	-
C3	-	-	-
C4	-	-	-

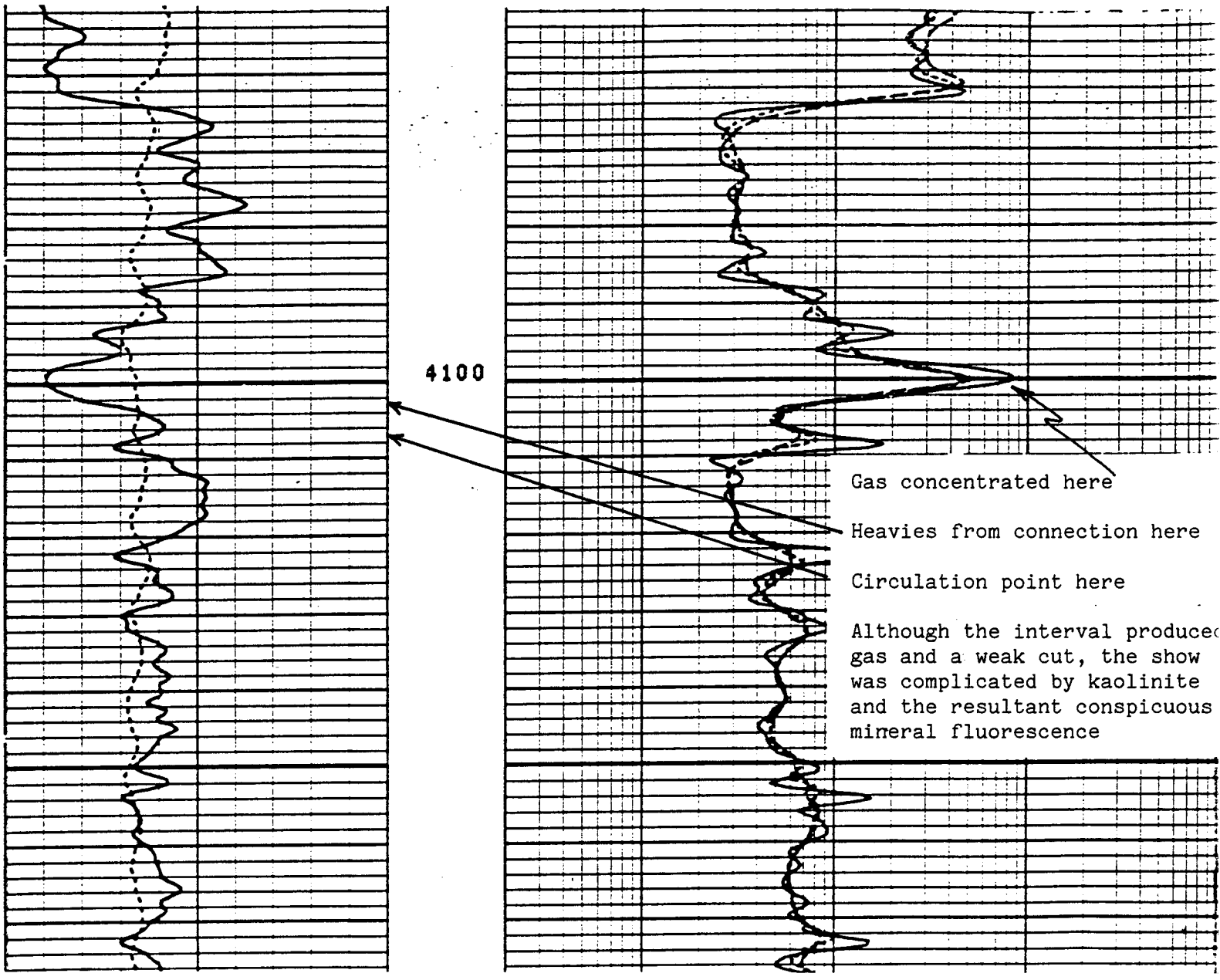
4100
Gas concentrated here
Heavies from connection here
Circulation point here
Although the interval produced gas and a weak cut, the show was complicated by kaolinite and the resultant conspicuous mineral fluorescence

Plate #2

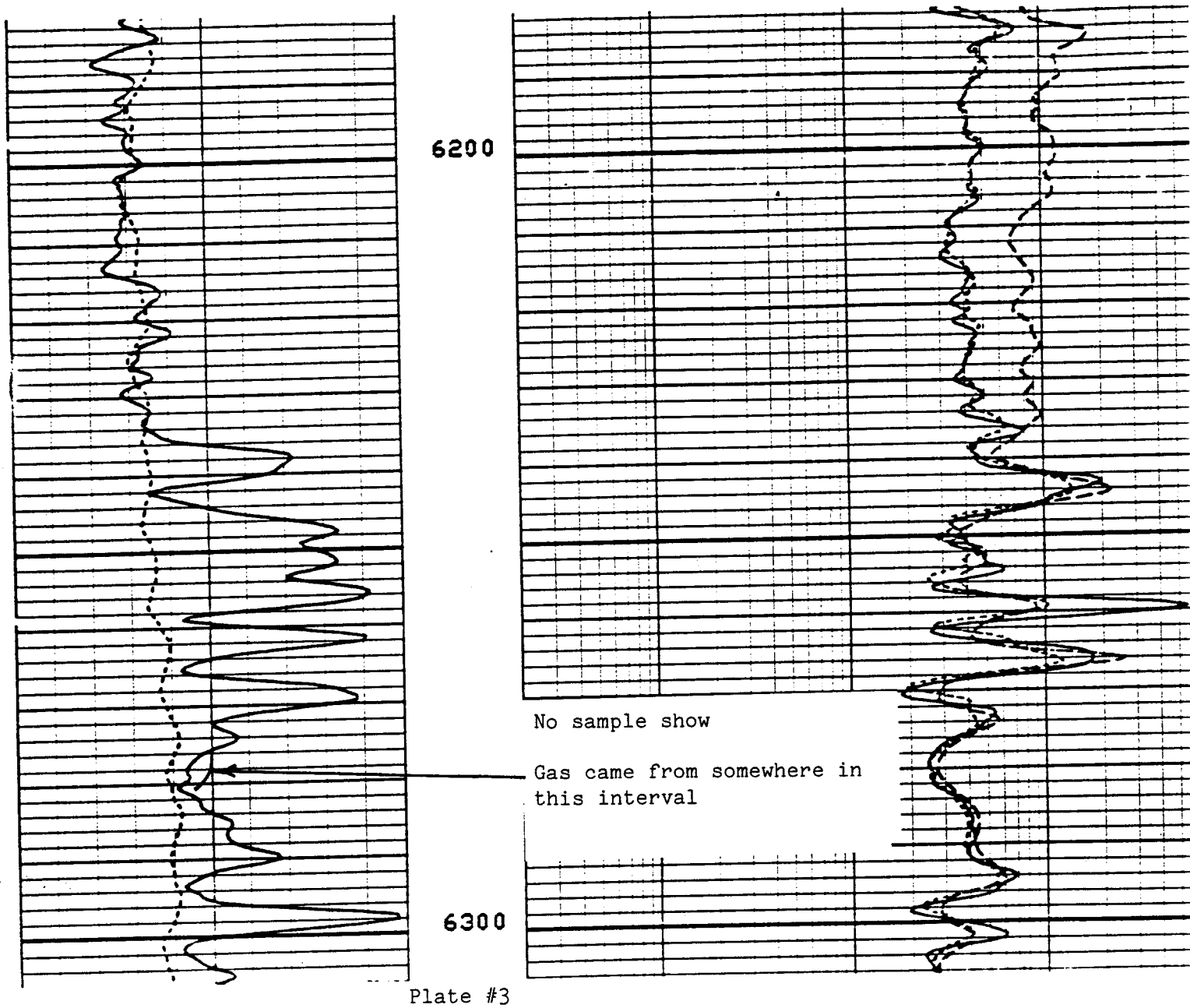
6200
No sample show
Gas came from somewhere in this interval
6300

Plate #3

Lithology:

Sandstone- light to dark reddish brown, very fine to fine to scattered slightly coarse, medium sorted, moderately frosted, quartz grains in a moderately firm to firm 60% montmorillinite and 40% hematite clay matrix; grades through siltstone

Conclusion:

1. Shale stringer 6266-6276 (E-log) acted as a barrier for a minute amount of gas which had migrated along the lower, dirty, Chinle sands.

Refer to Plate #4

#1 Third Bench of the Shinarump (Shinarump Conglomerate)
6520-6534 Strip Log 6508-6520 Electric Log

Reason: Two marginal wells from the Shinarump in the region, and, the excellence of the resevoir rock combined to make the Shinarump a tertiary target

Gas:	Before	During	After
Hotwire	3	22	5
C1	130ppm	400ppm	150ppm
C2	-	-	-
C3	-	-	-
C4	-	-	-

Lithology:

Sandstone- light yellow brown to clear, slightly coarse to coarse with at least two conglomeratic streaks, subangular to subrounded, slightly to moderately frosted, poorly to fairly poorly sorted, quartz grains in a 50% pore space and a 50% silicaceous matrix, good intergranular porosity, trace mineral fluorescence, trace chalky stain along thin montmorillinitic streaks, poor sample and gas show

Conclusions:

After the discreditation of the Weber formation, the E-logs were run, and, the best possibility to salvage the hole happened to coincide with this interval.

The following is a list of positive and negative factors which this zone embodied:

Positive Factors:

1. The interval (6508-6520 E-log) displayed good visual porosity.

2. The show interval was associated with an even better E-log show at 6478-6491.

3. Assuming that both the show interval and the above mentioned second E-log show were lithologically similar to the E-log zone 6451-6468, the sample show calculates a 42% water saturation and the E-log show at 6478-6491 calculates a 38% water saturation.

4. The sample and gas show interval produced 22 units Hotwire and methane.

5. The sample and gas show and the E-log show located almost immediately above were the best E-log shows on the well.

Negative Factors:

1. No significant oil indicators were found in the cuttings from either the sample and gas show or the E-log show.

2. The E-log show interval (6478-6491) produced neither gas or any sample show.

3. The assumption of lithological similiarity of the show zones to E-log zone 6451-6468 is not valid, based upon 1) samples and 2) differences in pentration rate (despite virtually identical drilling parameters.

4. Over both the gas and sample interval and the E-log show interval, the Spontaneous Potential deflects to the right, suggesting the zone is even "fresher" than formation waters of the zone (6451-6468) assumed to be 100% water saturated.

5. If the E-log show at 6478-6491 had better water saturations and displayed similar E-log characteristics on all logs, why did'nt the zone produce any gas?

6. No guarantee of an effective straddle test without two or even three tries seemed probable: the expense could be be prohibitive.

7. Under ideal conditions (a thin isolated show interval producing both gas and cuts), the Shinarump is a marginal producer in the area.

(Verbal communication--Robert E. Covington, Consultant Geologist for Anna W. P. Wells and associated partners)

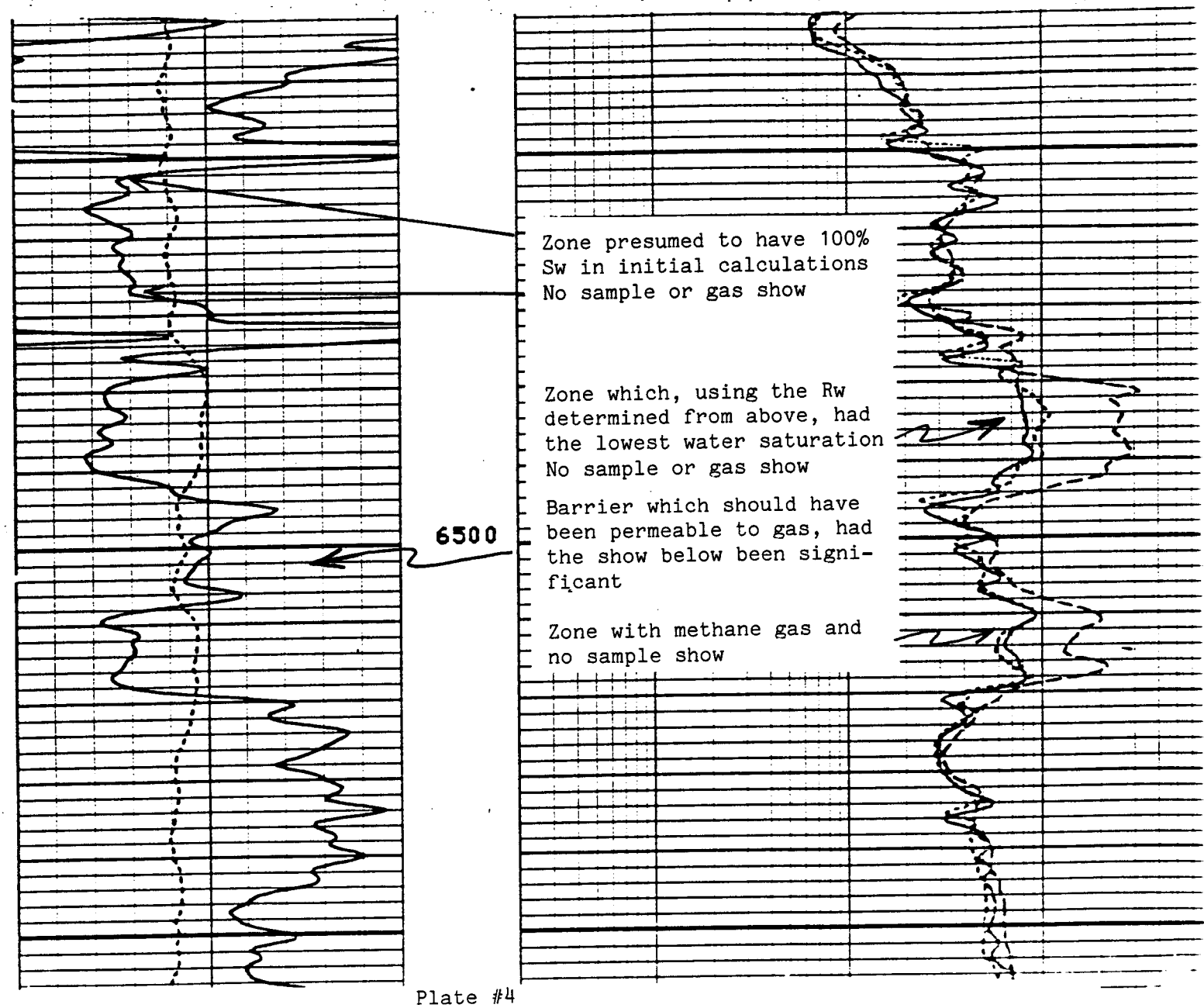
Zone presumed to have 100% Sw in initial calculations
No sample or gas show
Zone which, using the Rw determined from above, had the lowest water saturation
No sample or gas show
6500
Barrier which should have been permeable to gas, had the show below been significant
Zone with methane gas and no sample show

Plate #4

Refer to Plate #5

#1	Basal Phosporia	7370-7387	Strip Log,	7350-7372*	Electric Log

Reason: The well was drilled to prove or disprove the hypothesis that fracture porosity combined with an anticline defined trap might yield a reservoir similar to that found in the Ashley Creek Field.

Gas: None significant in the drilled portion of the Basal Phosphoria

Lithology:

Interbedded:

Sandstone- light to medium grey to scattered white, very fine to scattered fine, medium to well sorting, with a firm to very firm moderately to strongly calcic matrix, moderately to slightly frosted quartz grained, scattered dark brown residual stain, scattered flakey brown live oil stain, abundant organic trash, grades into a limestone, fluorescence, selective fair yellow to yellow green cuts

Limestone- tan to tan grey to cream, cryptosparmicrities to macrites, abundant pellets (to 1 mm- most often in lighter components), weak bioclastic textures, possibly locally algal, abundant thin silty to very fine rounded quartz sandstone lentils (to 3%), scattered pinpoint and flake live oil, scattered chalky stain, all in a firm to very firm, occasionally dolomitic matrix, organic trash

Conclusions:

1. The interval was not significantly fractured, due to 1) the lack of irregular torque observed on the drill floor.

2. All the live oil noted in the sample descriptions was matrix bound, as no significant gas show was noted.

3. Whereas large oolites were observed on the Ruth #1 offset well (private communication---Mark Palmer, Palmer Oil), small pellets were observed on the 16-1 Vernal, suggesting a lower environment of deposition.

4. When viewed with results from the Weber formation downhole, the differences in the amount of in situ oil found in the Basal Phosphoria on this well and the Ruth offset well strongly suggest that all the oil found in the primary targets of both wells antedates the Laramide

Refer to Plate #5 and Cores #3

#1 Upper Weber
7400-7405 Strip Log, 7386-7391 Electric Log

Reason: The well was drilled to prove or disprove the hypothesis that fracture porosity combined with an anticline defined trap might yield a resevoir similar to that found in the Ashley Creek Field.

Gas: None significant over the cored interval (while coring)

Lithology:

(For purposes of this discussion, comments concern intervals found in Core #3).

7400.6 - 7404.5

Sandstone- light to medium grey to white layers and darker grey to brown grey layers, very fine to fine grained, subround to rounded, medium to well sorted, quartz grains in a moderately strong to strongly dolomitic matrix. Occasionally, the matrix grades into dolomitic streaks. The darker streaks are often saturated with a dark brown to black live oil that seems bound by the dolomitic matrix into, what was formally, the more porous parts of the bedded sandstone. Perhaps 50% of the sandstone is oil saturated. Isolated dark brown to black live oil stain, fluorescence associated with this live oil, good yellow flash cuts from bound live oil, and a strong petroleum odor over all, is present.

(The core was field estimated at 7 - 9% porosity. The entire core was not fractured)

Retort Analysis- Summation of fluids Porosity:
(Conducted by TerraTek GeoScience Services)

Only the pertinent retort samples are quoted here:

Sample #	Depth	Perm Horiz	Perm Vert	Porosity	Oil Sat	Water Sat
4	7400.0-7401.0	.04		6.0	10.9	49.3
5	7401.0-7402.0	8.1		11.0	43.6	30.2
6	7402.0-7403.0	3.4		10.3	46.5	28.6
7	7403.0-7404.0	8.5		10.6	45.3	31.4
8	7404.0-7405.0	7.4		9.6	31.1	33.7

Conclusions:

Positive Factors:

1. There were three feet with 10 or more percent porosity

2. There were three feet with 40 or more percent oil saturation

3. There were three feet with 7 or more millidarcy permeability

(Further information is available in the Retort Analysis Enclosure)

Negative Factors:

1. No more than three feet of the positive factors listed above.

2. A lack of fractures in or near the oil saturated interval of Core #3 (there was no significant oil saturation on any of the other cores).

3. When the fractures developed in Core #4, the fractures were bleeding mildly sulphurous fresh water (see Core #4 Description as well as the Drill Stem Test Section).

4. The oil was asphaltic, and very devolitized.

5. The oil seems to have been formed at, or shortly after, the deposition of the Weber, and does not seem to have been significantly influenced by the formation of the anticline during the Laramide.

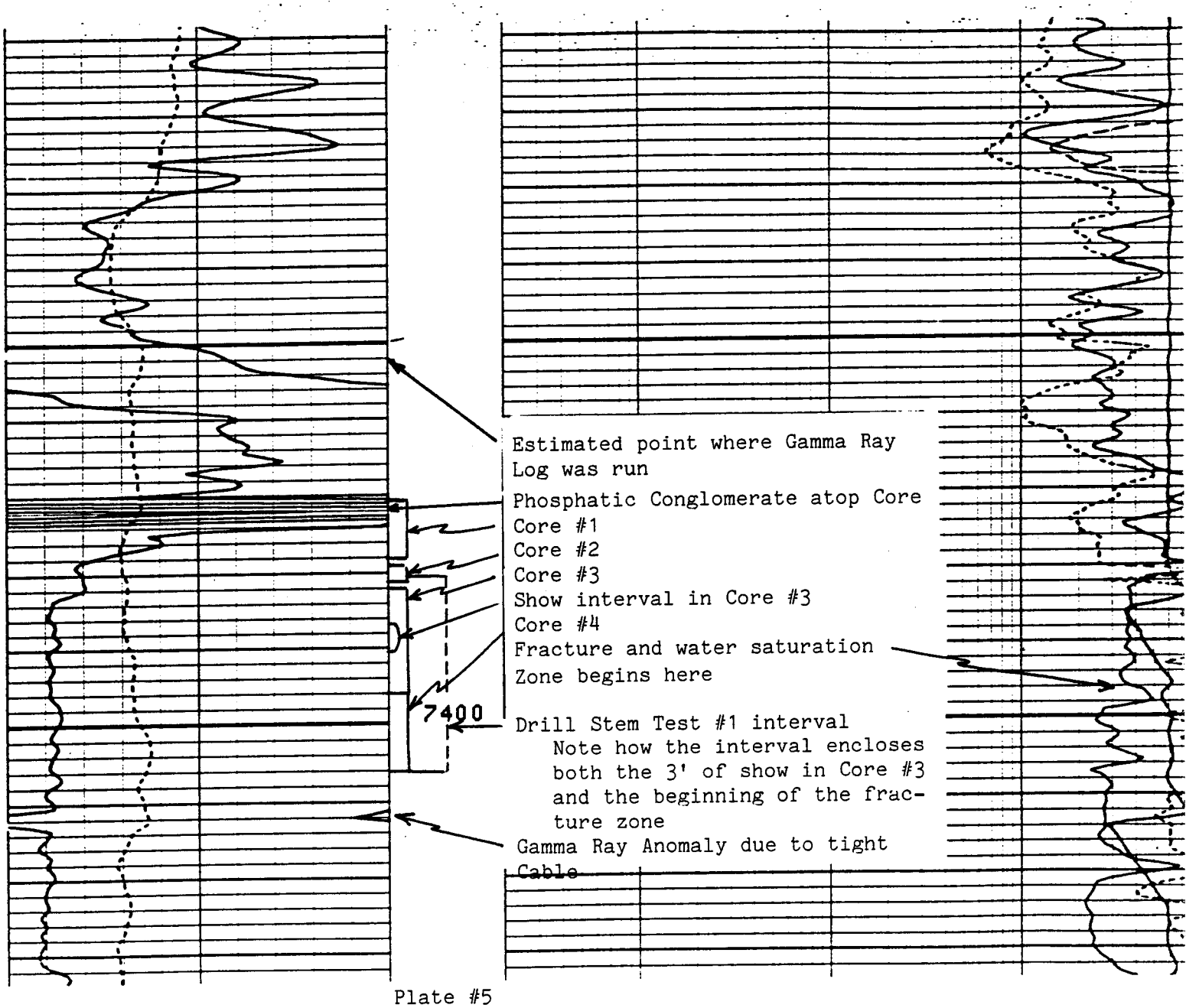
Estimated point where Gamma Ray Log was run
Phosphatic Conglomerate atop Core
Core #1
Core #2
Core #3
Show interval in Core #3
Core #4
Fracture and water saturation Zone begins here
7400
Drill Stem Test #1 interval
Note how the interval encloses both the 3' of show in Core #3 and the beginning of the fracture zone
Gamma Ray Anomaly due to tight Cable

Plate #5

CORE #1
7387-7393

(Recovered 5.4 feet of 6 feet drilled)

7387.0-7387.5

Phosphatic Conglomerate- phosphate nodules to 2 cm in size, in a very carbon rich/phosphatic matrix, capping a 1" phoshatic matrixed sand streak

7387.5-7388.0

Laminated Shales- light grey to medium grey, with abundant thin (generally 1/8th inch) petroliferous laminations, calcic

7388.0-7388.2

Laminated Shales- as above, with less petroliferous streaks. Zone seperated due to core breakage, most probably caused by the barrel jamming. There were no significant lithologic signs suggesting in situ fracturing.

7388.2-7390.5

After a transition zone that is more "shaley" than "limey":
Limestone- light to medium grey, cryptosparmicritic with thin microsparitic streaks bleeding fresh water?, scattered anhydrite nodules, two stylolites towards base

7390.5-7391.0

Limestone- light to medium grey to medium grey brown, crypto to microsparmicritc

7391.0-7391.6

Limestone- light to medium grey to grey brown, crypto to isolated microsparmicrites. Basically, an algal mat, displaying both a disturbed appearance, and thin, petroliferous coatings around "collapse" features

7391.6-7392.4

Interbedded:
Limestone- medium grey to dark grey and shaley, crypto/microsparmicritic,

high clay content. Scattered dark grey to black irregular oil rich/carbon rich layers (2-3%)

Shale- medium to dark grey, waxy, very firm, calcic

CORE #2
7393-7395.25

(100% core recovery. No evidence of previous core fragment not recovered during Core #1 found in Core #2)

7393.0-7395.25

Sandstone- white to light grey to clear, in a white very firm calcic matrix, very fine to fine subangular to subrounded, medium to well sorted, slightly to scattered medium frosted quartz grains. Spotty brown live oil in disconnected 3 - 5 mm circular spots. Very tight, yellow, spotty live oil fluorescence

Note: The entire core possesses varying sand content, with scattered light grey to slightly grey brown micritic limestone streaks. Carbon content is moderate to low and concentrated in shalier components.
Live oil fluorescence and the discontinuous live oil stain is most prominent in the bottom foot of the core.

CORE #3
7395.25-7409

(Recovered 12 feet of 14 feet drilled)

7395.25-7396.5

Limestone- white to medium grey, microcrystalline to cryptocrystalline, micritic, with shaley streaks at top; sandy (30%- mostly very fine, subangular, subrounded quartz grains), no mineral fluorescence, strong oil odor, strong yellow flash cut from dead? oil

7396.5-7397

Limestone- as above + more dolomitic. Thin 1" band of residual almost black sandy streak. Strong yellow flash cuts only from the black sandy streak. Only the band had any significant petroleum odor. Spotty live oil fluorescence

7397.0-7398.5

Dolomitic Limestone- light to medium grey to white, microcrystalline to cryptocrystalline, slight algal texture, 30% sand over all, scattered thin sandstone (very fine to fine) lentils, scattered live oil fluorescence towards base, moderate petroleum odor, weak green yellow cuts from non-fluorescent parts

7398.5-7400.6

Sandstone- white to light brown, very fine to fine, subangular to subrounded, well to medium well sorted quartz grains in dolomitic matrix, medium to dark brown "patchy" live oil scattered between the top of the interval and 7399.7. Below that depth, no fluorescence was present. Strong oil odor pervaded the core, and a bright yellow flash cut was produced throughout oil saturated sections

7400.6-7404.5

Sandstone- light to medium grey to white layers and darker grey to to brown grey layers, very fine to fine grained, subrounded to rounded, medium to medium well sorted, quartz grains in a moderately strong to strongly dolomitic matrix. Occasionally,

the matrix grades into dolomite streaks. The darker streaks are often saturated with a dark brown to black live oil that seems bound by the dolomitic matrix into, what was formally, the more porous parts of the bedded sandstone. Perhaps 50% of the sandstone over this interval is oil saturated. Isolated dark brown to black live oil stain, florescence associated with this live oil, good yellow flash cuts from bound live oil, and, a strong petroleum odor over all is present.

7404.5-7407 (2' missing from end of core, as discussed previously)

Sandstone- as the lighter part above, with significantly less layers showing oil saturation. The segment never-the-less showed both oil odor and good yellow cuts from chip samples exhibiting a widely dispersed intergranular live oil stain. No bleeding oil was present.

NOTE: Dispite the excellent oil saturation exhibited by segments of this core, the core was very tight as well not significantly fractured. Sledge hammers had to be used several times to break of the core from the core barrel when the core was being laid down. Consequently, inspite of the obvious oil saturation, no drill stem test was advised for the cored interval at the TD of 7409

NOTE: A thin shaley streak was noticed at the bottom of this core. This streak, less than 2" thick, appears, when viewed in conjuction with an extra segment retrieved during Core #4, appears to be a local feature, not a boundary for significant lithologic change.

CORE #4
7409-7419

(Cored 10 feet and recovered 11 feet. The uppermost foot was the remains of the 2 feet that had dropped off the bottom of Core #3. This extra foot represented the broken remains of the lost two feet and had been reinserted when coring began on Core #4.)

"7408.2-7409" (Three 4 inch 'boulders' with two cutting faces upon them)

Sandstone- light to medium grey to white with dark grey layers (to 1/2" thick), very fine to fine grained, subrounded to rounded, medium well sorted, quartz grains in a moderately strong dolomitic matrix. Approximately 10% of the vertical depth was dark brown to black matrix bound intergranular live oil, slight fluorescence associated with this matrix bound live oil (when the core was broken across the darker bands), good yellow flash cuts from this matrix bound live oil, tight- with the matrix porosity further reduced by shaliness

7409.0-7411.0

Sandstone- white to light grey, fine to occasionally medium grained with scattered slightly coarse, medium sorted, quartz grains in a firm dolomitic matrix. Very clearly cross bedded, with clear 4 to 5 inch beds, occasional disseminated pyrite observed on chips, very scattered (less than .5%) matrix bound oil stain- often associated with the lower levels and the uppermost levels of particular cross beds, no fluorescence, no cut, tight

7411.0-7412.1

Sandstone- as above, with a trace of possible fracturing (complicated by core barrel bit dynamics)

7412.1-7415.5

Sandstone- white to light grey, fine to occasionally medium grained, medium well to medium sorted, slightly to occasionally moderatedly sorted, quartz grains in a firm to very firm dolomitic to moderately calcic matrix. More massive than the sandstone above. Slightly fractured, with natural fractures extending subvertically and about 1 to 2 inches into the core. The core was bleeding water from these fractures: casual observation mislabeled the dark water component as traces of oil. Most likely, the dark color resulted from traces of sulphur in the water, as a sulphur smell was obvious in the waters recovered in the drill stem test over this interval. No fluorescence or cut was present, and the non-fracture porosity

was almost non-existent

7415.0-7419.0

Sandstone- white to light grey to clear, fine to medium grained, subangular to subrounded, medium to medium well sorted, quartz grains in a dolomitic to montmorillinitic cement. Strongly cross bedded, scattered natural vertical to subvertical fractures bleeding clear (nonsulphurous) water, tight, no fluorescence or cut

NOTE: A decision was made to test both this interval, as well as Core #3's interval, due to: 1) the obvious water contact precluded any further tests based upon extension under the oil/water contact, 2) because the prospect model demanded some kind of drill stem test over the upper sands of the Weber formation and (hopefull) water formation pressures would be low enough not to mask oil from Core #3 if present, and, 3) because water resistivities and formation pressures were needed to create a data base for any future resevoir analysis

AXEM RESOURCES

Well:	16-1 Vernal	State:	Utah	Date:	
Field:	Wildcat	County:	Uintah	ITCS F	
Drilling fluid:	LSND	Location:	Sec. 1-T5S-R21E	Elevat	

RETORT ANALYSIS - SUMMATION OF FLUIDS POROSITY

Sample Number	Depth (feet)	Permeability Horz (md)	Permeability Vert (md)	Porosity %	Saturation Oil %	Saturation H2O %	Grain Density (gm/cc)	Litho
	7387.0-91.0							Ls,dol stks
	7391.0-92.3							Sd,lmy
	7392.3-93.0							Not Recover
	7393.0-97.0							Sd,lmy
Weber Formation								
1	7397.0-98.0	.03		6.1	0.0	62.2		
2	7398.0-99.0	.13		7.7	22.8	40.7		
3	7399.0-00.0	.33		9.3	32.1	36.1		
4	7400.0-01.0	.04		6.9	10.9	49.3		
5	7401.0-02.0	8.1		11.0	43.6	30.2		
6	7402.0-03.0	3.4		10.3	46.5	28.6		
7	7403.0-04.0	8.5		10.6	45.3	31.4		
8	7404.0-05.0	7.4		9.6	31.1	33.7		
9	7405.0-06.0	1.4		7.6	6.6	69.2		
10	7406.0-07.0	1.6		7.7	13.1	50.5		
11	7407.0-08.0	2.1		8.2	4.5	48.4		
	7408.0-09.0							Not Recover
12	7409.0-10.0	2.0		7.3	0.0	23.7		
	7410.0-11.0							Sd,A/A
13	7411.0-12.0	1.6		7.6	4.9	41.0		
	7412.0-13.0							Sd,A/A

AXEM RESOURCES
Well: 16-1 Vernal

Date: 19-JAN-1988

RETORT ANALYSIS - SUMMATION OF FLUIDS POROSITY

Sample Number	Depth (feet)	Permeability Horz (md)	Permeability Vert (md)	Porosity %	Saturation Oil %	Saturation H20 %	Grain Density (gm/cc)	
14	7413.0-14.0	1.4		9.4	0.0	21.7		
	7414.0-15.0							Sd,A/A
15	7415.0-16.0	.46		7.9	0.0	24.9		
	7416.0-17.0							Sd,A/A
16	7417.0-18.0	1.2		9.0	0.0	29.7		
	7418.0-19.0							Sd,A/A

Drill Stem Test #1

Interval: 7394-7419 Strip Log

Formation: Lowermost Phosphoria and Upper Most Weber

Times: 15-60-60-180 Tester: Flopetrol Johnston

Note: Test times were shorted by the company man due to the leveling off of the surface blows in the final flow.

Surface Blows

Initial Open	Opened with a 1/4 inch blow, 4" blow at 5 minutes, 8" blow at 10 minutes, and a 10 1/2 inch blow at 15 minutes
Initial Shut-in	Died steadily and rapidly, with no erratic variations in surface blow
Final Open	Opened with a 1/8 inch blow, 7" at 10 minutes, 10" at 20 minutes, 16 inches at 30 minutes, SWITCHED TO PRESSURE GUAGE, 1/2 PSI from 30 to 60 minutes
Final Shut-in	Died steadily and rapidly, with no erratic variations in surface blow

Pipe Recovery

30'	drilling mud	.32 bbls	1.3 @ 60 F 600 ppm Cl
180'	mixed water with a trace of drilling mud	1.95 bbls	N/A
1556'	mildly sulphurous formation water	23.86 bbls	10 @ 60 F 90 ppm Cl
Total Recovery.....		26.13 bbls	

Sampler

0 cubic feet of gas (40 psi pressure on guage)	
2500 cc of mildly sulphurous water	10 @ 60 F 90 ppm Cl

Pressures	Outside	
	Initial Hydrostatic	3646
	Final Hydrostatic	3456
	Initial Flow	157-322
	Initial Shut-in	3075
	Final Flow	360-791
	Final Shut-in	3076
Temperature		130° F
Oil Recovery		4 specks the size of the tip of pencil lead

CONCLUSIONS

1. The test was successful as the packers held and the instruments functioned

2. Had the final flow been continued, water would have reached the surface in 3 to 4 hours

3. Pressures were still low enough that more oil would have been recovered had oil and porosity been present in Core #3

4. Core #3 was within 1 foot of the oil water contact

HOLE HISTORY

Note: Check Survey Sheet for Deviations

Note: The primary problem in drilling this hole involved minimizing hole deviation. Consequently, drill weight was inversely proportional to recorded deviation. Low weight on bits recorded below reflect use of the "pendulum effect" to reduce deviations as they occurred.

(Until Geologist arrived on location, all dates are keyed at 2300 hours)

12-07-87 Spudded. Drilled 73'. (WOB variable, RPM 70, PP 200, SPM 100)

12-08-87 2300 hours: 73'. Using a 8 ¼" bit, drilled to 93'. Switching to a 12 ¼" bit, drilled a total of 304' of new hole Tripped out of hole with (WOB 4-9k, RPM 100-125, PP 200-250, SPM 60-56)

12-09-87 2300 hours: 382'. Tripped back into hole with bit and circulated in preparation running surface casing. Tripped out of hole and rigged up to run casing. Ran 9 joints of 8 5/8" casing and a 24" shoe. Cemented, and, then waited on cement. While waiting, cut of surface casing at ground level, weld on, and, then pressured tested well head. Then, began rigging up BOPs.

12-10-87 2300 hours: 382'. Completed rigging up BOPs. Tested blind rams. Kelleyed up, ran ten stands into the hole, and tested pipe rams. Continued trip into hole, tagged bottom, and resumed drilling. Drilled 201'. (WOB 1-4k, RPM 60-70, PP 1050, SPM 58)

12-11-87 2300 hours: 593'. Drilled and ran surveys (WOB 4-6k, RPM 80/90, PP 1200, SPM 54)

12-12-87 2300 hours: 813'. Drilled and ran surveys (WOB 4-6k, RPM 65-80, PP 1250-1050, SPM 60-56)

12-13-87 2300 hours: 1131'. Drilled and ran surveys. Mudlogger rigged up and commenced logging 2200 hours (WOB 3-6k, RPM 90-80, PP 1050, SPM 60)

12-14-87 2300 hours: 1335'. Drilled, ran surveys, and tripped for a bit (WOB 4-6k, RPM 80-100, PP 1050-800, SPM 60-57)

12-15-87 2300 hours: 1530'. Drilled, ran surveys, and Geologist commenced work (WOB 2-4k, RPM 90-145, PP 800-750, SPM 58-59)

12-16-87 MND: 1813 Drilled, and ran surveys. Twisted off 2' after a connection. Waited on overshod. Tripped into hole and attached to fish. Began trip out of hole with fish (WOB 2-4k, RPM 90-158, PP 750-900 SPM)

12-17-87 MND: 1938 Lay down bent drill collars and drill pipe. Tripped into hole with available collars, and awaited replacements for those collars bent.

12-18-87 MND: 1938. New collars arrived, completed trip into hole, resumed drilling, and ran surveys (WOB 6-8k, RPM 80-85, PP 1000, PP 1000)

12-19-87 MND: 2287. Mudlogger released until hole depth depth was to reach around 3000. Drilled and ran surveys (WOB 4-8k, RPM 80-90, PP 1100, SPM 58-60)

12-20-87 MND: 2607. Tripped for bit, drilled, and ran surveys (WOB 8-15k, before survey, 3-4k, afterwards; RPM 65-90k, PP 1200-1000, DPM 60)

12-21-87 MND: · 2916. Mudlooger resumed operation at @3060. Drilled, ran surveys, and began trip out of hole for bit change (WOB 3-4k, RPM 75-85, PP 1200-1000, SPM 60-58)

12-22-87 MND: 3094. Completed trip for bit, drilled, and ran surveys (WOB 4-10, increased with surveys; RPM 70-95, PP 1200-1000, SPM 60)

12-23-87 MND: 3445. Drilled, and ran surveys. Tripped for bit. (WOB 8-14k, RPM 85-90, PP 1150-1000,SPM 60) Mud up noticed in drill rate.

12-24-87 MND: 3704. Drilled, and ran surveys (WOB 10-16k, RPM 70-90, PP 1200-1300, SPM 60)

12-25-87 MND: 3936. Drilled, ran surveys, and, tripped for the bit. Washed and reamed 50' to bottom before resuming drilling. Circulated samples @ 4117, due to gas kick from @4000-4007 (See Show Report) (WOB 12-18k, RPM 75-90, PP 1300, SPM 60-63)

12-26-87 MND: 4117. Resumed drilling, and, ran surveys (WOB 10-13k, RPM 60-80, PP 1300, SPM 62)

12-27-87 MND: 4377. Drilled, and ran surveys (WOB 16-28k, RPM 62-60, PP 1300-1000)

12-28-87 MND: 4612. Drilled, ran surveys, and, tripped for a bit. Removed IBS (stabilizers) from string (See Deviations) (WOB 18-30k, RPM 60-70, PP 1200-1050)

12-29-87 MND: 4808 Drilled and ran surveys. (WOB 33-45k, RPM 60-65, PP 1050-1100, SPM 60)

12-30-87 MND: 5290 Drilled, and ran surveys. When drilling the Navaho Formation, differential sticking between the collars and the wall of the hole was noted both at connections, and, at the more time consuming survey downtimes. (WOB 45-15k, survey increased from 3-4° at 5690, causing drillers to use less weight; RPM 60-70, PP 1100-1150, SPM 60)

12-31-87 MND: 5842. Drilled, and ran surveys. Surveys steadily increased, despite reducing the weight on the bit. A maximum of 6 1/2° was recorded on a 6-12° sensitive survey tool (See Deviation Section). Consequently, after @6191, weights were drastically reduced, and, penetration rates greatly slowed (WOB 33-10k, RPM 60-70, PP 1150, SPM 60)

01-01-88 MND: 6223. Drilled very slowly, ran surveys, and, began trip for bit. (WOB 10-8k, RPM 90-75, PP 1150, SPM 60)

01-02-88 MND: 6271. Completed trip for bit, washing and reaming 140' to bottom. Resumed drilling with low weight (WOB 8-12k, RPM 75, PP 1100-1200, SPM 60)

01-03-88 MND 6300. Ran survey, and drilled with low weight (WOB 12-14k, RPM 70-75, PP 1200, SPM 60)

01-04-88 MND: 6332. Ran surveys, and drilled with fairly low weights (WOB 14-25k, RPM 65-75, PP 1200, SPM 60)

01-05-88 MND: 6462. Ran surveys, and drilled with slightly higher weights, due to straightening out of well bore (WOB 20-25k, RPM 60-75, PP 1200, SPM 60)

01-06-88 MND: 6570. Tripped for bit. Washed and reamed from @ 5040-5380, and reamed 140 feet to bottom. Resumed drilling and ran survey (WOB 25-34k, RPM 65, PP 1200, SPM 60)

01-07-88 MND: 6689. Drilled and ran survey (WOB 15-35k, RPM 60-65, PP 1100, SPM 55)

01-08-88 MND: 6875. Drilled and ran surveys (WOB 30-35k, RPM 60, PP 1100, SPM 55)

01-09-88 MND: 7038. Drilled and ran surveys (WOB 30-25k, SPM 60-65, PP 1100, SPM 55)

01-10-88 MND: 7163. Drilled, ran surveys, and began trip out of hole for bit (WOB 25-20k, RPM 65, PP 1150-1200, SPM 55)

01-11-88 MND: 7214. Completed trip for bit, washing and reaming 150' to bottom. Resumed drilling (WOB 30k, RPM 65, PP 1300, SPM 55)

01-12-88 MND: 7342. Drilled, and circulated up samples at @ 7360, and @ 7370 in preparation for running Gamma Ray Log to establish hole positionV is-a-vis Ruth #1. Short tripped 30 stands, washed 20' to bottom, and tripped out strapping (7366 at 7370, no correction made). E-loggers arrived on location (closed hole logging truck), and tripped into hole with closed hole Gamma Ray Tool and could not pass @ 2911. Tripped out of hole with closed hole too, and tripped into hole with open hole Gamma Ray with a Sonic tail as dead weight. Again, could not pass ! 2911. Tripped out of hole with E-log tool, and began trip in with 100% drill pipe open faced string into hole (WOB 30k, RPM 65, PP 1300, SPM 55)

01-13-88 MND 7370. Completed running open face drill string into hole. Ran closed hole Gamma Ray tool to bottom and completed log. E-log TD of 7337 reflected significantly different depth due to: 1) no footage ticks on closed hole E-logging cable, 2) possible 4 foot error due to hole fill, causing drill string to fail to reach bottom, and 3) possible misinterpretation by E-log hand of E-log depth (7337 versus 7340) due to misreading cable slack. Tripped out of hole with drill string after picking up collars. Drilled 17' (extra foot over the 16' crews instructed to drill likely a function of miscalculating pipe slack, and hole deepening due to washing and reaming). After drilling the 17', circulated and began trip out of hole (WOB 40k, RPM 65, PP 1400. SPM 59)

01-14-88 MND: 7387. Completed trip out of hole with drill bit, assembled Core #1 string assembly, washed and reamed bridges at @ 3940-3985, and at @ 6128-6198, as well as washed and reamed 12' to bottom. Core to 7393, and tripped out of hole. 5.4' recovered, and, core examination strongly suggested jamming at 7388. After viewing the core, tripped back in in preparation for Core #2. Washed and reamed 20' to bottom, and, circulated out bottom hole fill.

01-15-88 MND: 7393. Cored 2.25', barrel jammed, recovered 2.25' in core #2, and tripped back into hole with the addition of a stabilizer. Washed and reamed 20' to bottom. Cored 14 feet and pulled core due to suspected stratigraphic position. Began trip out of hole with Core #3. Discovered a 3' difference (uphole) began geolograph and pipe tally.

01-16-88 MND: 7409. Completed trip out of hole with Core #3. Laid down core, and the core was tight (visually estimated at 7 to 9%) and hammers were used to break core out of barrel. After core

examination by all onsite geological personnel and appropriate contacts were made, tripped back into hole with Core #4 string. Cored 10 feet, and core was pulled due to: 1) suspect position in stratigraphic column, 2) need to pull DST in order to re-affirm visual estimates of Core #3 properties, and 3) in order not to waste a day circulating prior to running the DST. Picked up test too, and began trip into hole with DST #1 string.

01-17-88 MND: 7419. Completed trip into hole with DST #1 string. Tested, and tripped out of hole, Decision made to TD at 7520. Tripped into hole with drill string, but could not break circulation. Suspecting gelled mud, twice tripped out ten stands and kelleyed up, without establishing circulation. Began trip out of hole

01-18-88 MND: 7419. Completed trip out of hole, where 1 foot of sawdus was discovered to be pressured packed in the bit sub. Tripped back into hole and reamed 180'. Drilled to TD at 7520. Circulated for logs, tripped out of hole with bit, rigged up loggers, and commenced logging. Released mud logger at TD (WOB 35k, RPM 80, PP 1200, SPM 55)

01-19-88 MND: 7520. Completed logging with no significant problems except for: 1) having to pull tight over the first 50 feet of DLL run, and 2) sending second trial run over the Weber Formation of the DLL due to problems created by point #1. Completed logging, and contacted several partners. Decision was made to plug and abandon. Geologist released 1530 hours.

DEVIATIONS

Depth	Deviation	Comments
110	1/4	
220	0	
290	1	
321	3/4	
382	3/4+	
530	1 1/2	
564	1 3/4	
596	1 3/4	
627	1 3/4	
659	2	
690	1 3/4	
759	1 3/4	
821	1 3/4	
883	2	
940	1 3/4	
976	1 3/4	
1038	1 1/2	
1194	2	
1250	2	
1318	2 1/8	
1400	2 1/8	
1474	2 1/4	
1536	3 1/4	
1597	2 1/4	
1680	2 1/2	
1710	2 1/4	
1781	3 1/4	
1812	3	
1844	3	
1874	3	
1906	3	
2000	3 1/4	
2030	3 1/4	
2111	3	
3185	3 1/4	
2248	3 1/2	
2310	3 3/4	
2380	3 1/4	
2460	3 1/4	
2560	3 1/4	
2748	3	
2789	3	
2843	3 1/2	
2900	3 3/4	

2930	3 3/4	
2970	3 3/4	
3032	3 7/8	
3063	3 1/2	
3094	3 1/2	
3125	3 1/2	
3186	3 1/4	
3248	3 1/8	
3311	2 3/4	
3405	2 3/4	
3498	2 1/2	
3591	2 1/2	
3660	2 3/4	
3775	2 1/2	
3867	3	
3925	3	
3958	3 1/4	
3972	3 1/4	
4100	3	
4267	3 3/4	
4390	4	
4532	3 3/4	Removed IBS (stabilizers) from string
4832	3 1/4	
4948	3	
5100	3	
5258	1	Misrun? Net deviation 4°?
5413	3	Drilling with 40/42k WOB
5560	3	Drilling with 40/42k WOB
5690	4	Drilling with 40/42k WOB
5850	4 3/4	Drilling with 14k WOB (as of 5820)
5976	4 1/4	Drilling with 20/23k WOB
6161	6	Drilling with 20/23k WOB
6193	6 1/4	Using chart that records deviations greater than 6°. Drastically reduced drilling weights ensused
6211	6 1/2	Drilled with 2/4k WOB. Decision made to proceed "joint" by "joint" in an attempt to reduce deviation
6250	6	
6274	5 3/4+	
6307	6	
6338	5 1/4	
6367	4 1/4	
6400	4 3/4	
6431	4 +	
6463	3 1/2	
6565	2 3/4	
6628	1 1/4	
6681	1	
6815	1 7/8	
6939	3	
6970	3 1/4	
7032	3 3/4	
7093	3 3/4	
7153	4 3/4	

7183	4 7/8!
7210	4 1/2
7277	4 3/4
7326	4 3/4

BIT RECORD

Bit #	Hole Size	Make	Type	Depth Out	Hours Run
Drilled surface with an 8 3/4" bit, and 2 12 1/4" bits in less than 12 hours					
1	7 7/8	Smith	A-1	950	38 1/2
2	7 7/8	Smith	FDT	1474	51 1/4
3RR	7 7/8	Smith	A-1	1938	46 1/2
4	7 7/8	Security	DSJ	2789	68
5	7 7/8	Security	DSJ	3095	24
6	7 7/8	Reed	HP 13	3660	35
7	7 7/8	Security	FDT	3972	26 3/4
8	7 7/8	Smith	F3H	4717	62 1/2
9	7 7/8	Smith	F2	6271	84 3/4
10	7 7/8	Reed	HP53A	6570	70 1/4
11	7 7/8	Smith	F2	7214	94 1/2
12	7 7/8	Smith	F3	7387	11 1/2
12A	7 7/8	Reed	Diamond	7419	24 1/2
13	7 7/8	Reed	HP62A	752	11 1/2

NOTE: From 1818 to 1938, the footage was drilled with a 2 to 4 thousand pound bit weight. Consequently no effort was made to coorelate "sample interval" with lithology. Instead, samples were described by "caught interval."

1813-1840

Shale- grey, subwaxy to earthy, moderately firm to firm, often gooey, platey, calcic, silty (5%), isolated quartz/calcic very fine to fine sandstone grains, scattered fossil fragments (inoceramus), no fracture indicators

1840-1870

Shale- as above

1970-1900

Shale- grey to earthy to subwaxy, moderately firm to firm, gooey in part, platey, calcic, silty (10%), quartz/calcite very fine to fine sandstone grains (3%), scattered fossil fragments, no fracture indicators

1900-1938

Shale-grey, earthy to subwaxy, soft (samples washed differently than previously) to firm, gooey in part, calcic (grades into thin bedded wackstones in 3% of sample), silty (5%), laminated- but not fissile, scattered calcicte/quartz sandstone grains, fossil fragments, no fracture indicators

NOTE: Twised off 185' below surface. When drilling was resumed, the weight on the bit was increased to around 8 thousand pounds. Consequently, unless otherwise note, lithology and penetration rate are coorelated.

1938-2000

Shale- greys, earthy to subwaxy, soft to firm, gooey in part, calcic, silty (5%), isolated sandstone grains, isolated tan to brown thin bedded cryptosparitic limestones (1%) at the top of the interval, trace very fine tan to bufff "boundstone" beds towards top- .5% of sample, no fracture indicators.

2000-2030 (Weight reduced to enhance "pendulum effect" to reduce deviation.")

Shale- as above, with less sandstone grains and no limestone streaks.

2030-2112

Shale- grey with scattered grey browns, subwaxy to earthy, soft to firm, calcic, gooey in part, silty (2%), trace very fine quartz sandstone grains, scattered microfossils, no significant fracture indicators.

2112-2158 (Slow drilling rate a function of "pendulum effect)

Shale- grey, earthy to subwaxy, soft to firm, gooey in part, calcic, silty (3-4%), scattered quartz/calcic very fine sandstone grains, platey to subblocky, scattered microfossils, trace clear calcite fragments

2158-2204

Shale- as immediately above, with scattered thin brown grey cryptosparmicrites, scattered inoceramus

2204-2216

Shale- grey, earthy to subwaxy, soft to firm, gooey in part, calcic, subblocky, silty (2%), isolated very fine quartz grains, grades into argillaceous limestone/"marlstone"(5%)- with isolated dense brown cryptosparitic beds

2216-2308

Shale- grey, earthy to subwaxy, soft to firm, gooey in part, calcic, subblocky - platey, scattered silty zones (2%) of samples, trace isolated quartz sandstone grains, grades into limestone in a very small part

2308-2363

Shale- grey, earthy to subwaxy, soft to firm, gooey in part, subblocky - platey, calcic, scattered silty zones (2%). local micaceous shale streaks, isolated quartz sandstone grains, marly in part, isolated carbonaceous streaks, no evidence of fracture fill

2363-2430

Shale- grey, earthy to subwaxy, soft to firm, gooey in part, subblocky - platey, calcic, scattered silty zones, locally sandy streaks (1%), micaceous in plattier parts, trace isolated disseminated pyrite (no unusall torque on floor), no fracture fill

2430-2474

Shale- grey to trace dark grey, subwaxy to earthy, soft to scattered very firm, platey to subplatey, calcic, gooey in part, scattered micaceous streaks, thin carbonaceous partings, trace disseminated pyrite (in association with carbonaceous partings), occasionally silty (2%)

2474-2602

Shale- grey to scatttered dark grey, subwaxy to earthy, soft to firm, calcic, gooey, silty (to 5%), very fine to fine rounded quartz grains (to 2%), occasionally marly (academic question), microfossils, scattered disseminated pyrite (2500-2530 sample), thin carbonaceous streaks (2525-2555 lag adjusted)

2602-2686

Shale- grey to trace brown grey, subwaxy to earthy, soft to firm, calcic, gooey, silty (to 5%), very fine rounded quartz grains (to 3%), occasionally marly, less carbonaceous than immediately above, trace pyrite

2686-2790

Shale- grey, subwaxy to earthy, soft to firm, calcic, gooey, silty (to 3%). scattered very fine quartz sandstone grains (to 2%), occasionally marly, scattered microfossils

2790-2885

Shale- grey, subwaxy to subearthy, soft to firm, gooey, calcic, slightly silty (to 1%), trace isolated very fine quartz grains, scattered thin brown cryptosparmicrites (possible worm hole fill), scattered inoceramus, no fracture fill

2885-2950

Shale- grey, subwaxy to subearthy, soft to firm, gooey, calcic, trace silty, trace very fine sandstone grains, scattered cherty brown cryptosparmicrities, trace fossils

2950-3027

Shale- grey with trace dark grey, subearthy to subwaxy, soft to firm, gooey, moderately to strongly calcic, trace carbonaceous laminations (upper part)

3027-3058 (Different penetration rates are due to weight variations)

Shale- as above

3058-3120

Shale- grey with trace dark grey, subearthy to subwaxy, moderately to strongly calcic, soft to firm, moderately gooey, silty (2-4%), scattered fine to very fine quartz grains (to 5%), trace carbonaceous laminations (uuper part), no fracture fill

3120-3188

Shale- grey to trace brown grey, earthy to subwaxy, moderately firm to firm, moderately calcic, slightly to moderately gooey, silty (to 10%), very fine to fine rounded quartz sandstone grains (to 5%), moderately calcic, trace carbonaceous laminations, microfossils, trace disseminated pyrite

3188-8236 (Penetration rate variations partly a function of weight variation)

Shale- grey to trace brown grey, earthy to subearthy, firm to moderately firm, moderately calcic, silty (to 12%), very fine to fine rounded quartz grains, becoming increasingly brittle, occasional "slump" features

3236-3283

Shale- grey to dark grey, earthy to subwaxy, moderately firm, moderately to strongly calcic, silty (to 7%), scattered very fine rounded quartz sandstone grains, trace disseminated pyrite

3283-3311

Shale- grey, subearthy to trace subwaxy, soft to trace very firm, moderately calcic in part, to 4% silt (as isolated streaks), very fine to fine rounded quartz grains, trace carbonaceous trash

3311-3320

Shale- as above with a large amount of silt, very sandstone grains, argillaceous, possibly bentonitic matrix and/or bentonite streaks

3320-3368

Shale- grey, earthy to surbwaxy, soft and gooey to firm, subwaxy, slightly to occasionally moderately calcic, to 5% silt, to 5% thin bentonites, isolated very fine quartz grains, scattered disseminated pyrite

3368-3420

Shale- grey to scattered light and trace dark grey, subblocky, earthy to subearthy, slightly calcic to calcic, to 3-4% silty (does not appear bentonitic), trace very fine quartz sandstone grains

3420-3440

Shale- as above, but more silty

3440-3500

Shale- grey to a trace dark grey, earthy to subearthy, subblocky, soft and gooey to firm, slightly to moderately calcic, laminated, to 3% silty, trace very fine sandstone grains, trace disseminated pyrite

3500-3564

Influx of Interbedded:

Shale- light grey to grey, subearthy to earthy, slightly firm to firm, platey to subblocky, moderately gooey, moderately calcic, moderately silty (to 15%), sandy in part

Sandstone- light grey to occasionally medium grey, very fine subrounded well sorted quartz grains in a moderately firm clay calcic matrix, scattered organic trash
Siltstone- light grey to light brown, platey, calcic, argillaceous
Which grades into:
Limestone- buff to light grey, cryptosparmicritic to biomacritic, moderately firm to firm, thin bedded, isolated very fine to fine quartz sandstone lentils

3564-3586

Interbedded
Sandstones/Siltstones- as in previous sample description
Shales- medium to a trace dark grey, subearthy to subwaxy, soft to firm; calcic streaks, platey to subplatey, thin bentonit
Limestone/Calcic Bound Sandstone- white to buff, biocrytosparitic, tight, no show

3586-3591

Sandstone- light grey to white to trace medium grey, very fine to fine subangular to subrounded quartz grains in a calcitic clay matrix, well sorted, silty, trace organic trash, no permeability

3591-3610 (Very poor sample)

Siltstone- light grey to grey, largely ground up, probably plately, calcic matrix, grading into very fine rounded quartz sandstone
Shale- grey to light grey, platey to subblocky, moderately firm to firm, moderately to strongly calcitic, occasionally silty and sandy

3610-3626

Shale- as the "Shale" description immediately above

3626-3642

Sandstone- light grey to white, fine to trace slightly coarse subrounded to subangular well to moderately well sorted quartz grains in a moderately firm calcic clay matrix, matrix clays grading into thin shale streaks, scattered organic trash at top, tight

3642-3662

Gradational change to:
Sandstone- light grey brown to light grey to scattered clear, trace frosted, fine to scattered moderately coarse, subangular to subrounded quartz grains in a firm to moderately firm calcic clay cement. Visible bedding planes. Scattered organic trash,

tight matrix, no show
Interbedded with:
Shale- grey, subplatey, moderately firm to firm ; calcic, very silty and sandy

3663-3692

Shale- grey to light grey, earthy to subwaxy, soft to firm, calcic, silty (to 50%), abundant very fine to fine quartz grains (to 20%), scattered grey cryptosparitic dense limestone streaks
Siltstone- (10% as major component)- in general, as above shale
Sandstone- (25% as major component)- light grey to grey, very fine to fine subrounded to subangular moderately to slightly frosted moderately well sorted quartz grains in a calcic clay cement, scattered organic trash, tight, no show

3692-3700

Sandstone- light grey, salt and pepper; very fine to fine to trace medium rounded to subangular moderately sorted quartz grains in a very tight calcic clay matrix, slightly frosted grains, occasionally glauconitic, silty, no show

3700-3715

Shale- grey, earthy to subearthy, subplatey, moderately firm to firm, silty (to 40%), sand (to 10%), calcic, occasional disseminated pyrite

3715-3747 SEE FRONTIER SHOW REPORT

3747-3790
Predominently the first, with less of the others:
Sandstone- light grey, very fine to fine (grades into siltstone), slightly frosted, well sorted, quartz grains in a tight clay matrix; occasional organic debris, tight
Shale- light grey, subblocky, earthy, moderately firm to firm, silty (to 20%), sandy (to 7%), disseminated pyrite associated with organic debris, to moderately calcic

3790-3868

Sandstone- light grey, very fine (almost a siltstone) quartz grains in a very firm to hard silicaceous cement
With Streaks:
Sandstones- as in 3747-3790 sample
Shale- grey to dark grey, earthy to subearthy, firm to trace very firm, subplatey, calcic, occasionally very sandy, trace carbonaceous streaks, scattered ground up calcite nodules

3868-3910

Shale- grey to dark grey, earthy to subearthy, subblocky, moderately firm to firm, slightly to moderately calcic, sandy(grades into sandstone), silty, trace pyrite, occasionally carbonaceous matrix

Sandstone- grey, very fine to trace fine, rounded, well sorted, quartz grains in a slightly, to moderately calcic, clay/silicaceous matrix; silty, grades into shale, moderately firm to very firm, argillaceous, tight

3910-3916

Sandstone- light grey, very fine to fine rounded quartz grains in a moderately firm, very argillaceous, moderately calcic, clay matrix (less silicaceous than above)

3916-3960

Shale- dark grey to grey, subwaxy to scattered earthy, very firm to slightly firm, occasionally moderately calcic, subplatey, occasionally splintery, scattered disseminated pyrite, scattered silty (to 10%) in less carbonaceous parts (at no time very significant); isolated, very fine rounded quartz grained, well sorted, moderately firm, and, moderately calcic matrixed sandstone lentils.

3960-3976

Interbedded

Siltstone- light to medium grey, moderately firm, on borderline between shale/siltstone, slightly calcic, scattered organic trash, isolated fine sandstone grains, scattered disseminated chert

Shale- grey to dark grey, subwaxy and dark to earthy and light, subplatey and moderately silty to subblocky and silty; occasionally very fine isolated sandstone grains, isolated white calcite clasts (possibly in the siltstone as well)

3976-4009

Interbedded

Sandstone/Siltstone- grey, very fine to trace fine rounded well sorted slightly frosted quartz grains in a very firm to hard silicaceous matrix, tight

Shale- dark grey to light grey, subwaxy to earthy, subplatey to blocky, slightly to moderately calcic, increased presence of very fine rounded quartz grains with depth, scattered carbonaceous material

4009-4016

Sandstone- white to light grey, very fine to fine, well sorted, slightly coarse, slightly frosted quartz grains in a firm to very firm and brittle, occasionally calcic- often dolomitic matrix, no stain, scattered mineral flourescence, no show

4016-4029

Sandstone- dark grey, very fine quartz grains ina silty, organically trashy, silica matrix; with silty/shaley streaks

4029-4037

Sandstone- white to light grey to clear, slightly coarse to isolated coarse, moderately well sorted slightly frosted quartz grains, isolated loose coarse grains; very firm to firm, often brittle, thin calcitic clay streaks, 35% kaolinite matrix, 35% dolomitic matrix, 10% silica matrix, 20% calcite matrix; scattered disseminated pyrite

4037-4047

Sandstone- grey to scattered brown grey, very fine (grades into siltstone) quartz grained in a very firm to hard tight, silicaceous matrix, shaley streaks, no show

4047-4070

Sandstone- white to light grey to clear, fine to slightly coarse subangular to scattered subrounded, slightly frosted, moderately well sorted quartz grains in a friable clay matrix (most of which washed out). Montmorillionic in part, trace asphaltic residual stain, porosity indeterminable, no show

With streaks:

Shale- light grey, waxy to subwaxy, platey to subblocky, moderately firm to firm, slightly to moderately calcic, laminated in part, occasionally silty, probable very fine sandstone lentils

4070-4082

Sandstone- white to scattered light grey, fine to slightly coarse, moderately frosted, medium well sorted, subangular quartz grains in a firm to very firm, moderately dolomitic crystalline to slightly calcic matrix; trace waffelite, to fair intergranular porosity (probably over limited horizontal distances), occasionally shaley

4082-4100

Sandstone- in general, as above, but with more clay in matrix
Plus:
Shale- medium grey, subwaxy, blocky, firm, scattered mud pellets, scattered relic contraction cracks, abundant pyrite

4100-4107 SEE "LAKOTA" (LOWEST DAKOTA) SHOW

4107-4117

Limestone- light brown to cream to occasionally white, cryptospar-micritic, firm to scattered very firm, locally dolomitic, possible disseminated chert, shale streaks, possibly silty, pyritic, no show

4117-4148

Interbedded
Limestone- light grey to buff, cryto-microsparmicritic to microspar-macritic, firm to slightly hard, occasionally dolomitic, grading into shale, argillaceous in part, tight, no show
Shale- light grey to reds and oxi-colors, subwaxy to earthy, soft to moderately firm, blocky to subplatey, silty in part, scattered organic trash

4148-4158

Limestone- as above, but increasingly sandy and silty
As is the:
Shale-as above, siltier

4158-4186

Limestone- buff to light grey, microsparmicritic with scattered macrites, scattered relic fossil texture, silty in part, tight
Shale- light brown grey to light grey, trace oxi-colors (possibly cavings); earthy to subwaxy, subplatey to subblocky, silty, occasionally sandy, soft to moderately firm; to occasionally moderately calcic
Chert- buff to light grey, dense

4186-4214

Interbedded:

Limestone- light grey to grey, possibly scattered purples and browns; micro to cryptosparmicrites and micrites, moderate to very firm, occasionally dolomitic, argillaceous in part, silty in part, isolated very fine quartz sandstone grains, sandstone lentils, local disseminated chert, tight

Shale- grey to dark grey purple, waxy to subwaxy, moderately firm to firm, moderately calcic, silty, locally sandy

4214-4220

Sandstone- white to light grey to scattered clear, very fine to trace slightly coarse, slightly frosted, well sorted quartz grains in a moderately firm calcitic crystalline to clay matrix, no stain, tight

4220-4240

Interbedded:

Shale- grey to scattered brown, earthy to waxy, moderately firm to firm, blocky to subplatey, moderately/strongly calcic, both silty and sandy

Limestone- light grey to scattered purple browns, cryptosparmitic, firm to trace very firm, silty and sandy

4240-4256

Sandstone- light grey to clear to trace grey brown, fine to slightly coarse, slightly frosted, well to medium well sorted, quartz grains; interbedded with, and, matrixed by, a moderately firm calcic matrix

4256-4264

Shale- light brown to scattered brown grey, earthy to subwaxy, firm to very firm, moderately calcic to calcic, blocky to subblocky, silty and sandy

4264-4268

Sandstone- as in 4240-4256 description

4264-4334

Interbedded:

Limestone- light grey to buff grey, microbiomicritic to macritic, firm to very firm, scattered fossil hash streaks, locally silty, with scattered poorly sorted fine to slightly coarse quartz sandstone lentils; occasionally pyritic, locally anhydritic, cherty in

part, tight
Shale- grey to brown grey to dark grey to brown (towards base), subwaxy to subearthy, moderately firm to trace very firm, slightly calcic, silty, occasional quartz sandstone grains, pyritic in part

4334-4352

Sandstone- white to light grey, very fine to slightly coarse, medium sorted, frosted, subangular quartz grains in a moderately firm to firm calcic matrix (top part); becoming less calcic, more of a tan color, of a smaller grain size (obviously more than one bed); no show

4352-4406

Interbedded
Chert- brownish pink to trace pink (grades into pure form, from being a matrix)
Sandstone- light brown to brown pink (when oxidized) to greys (when reduced), very fine to slightly coarse, moderately frosted, medium well sorted, quartz grains in a silica to occasionally hematitic to unknown clay matrix; very firm to hard, occasionally slightly calcic, extremely tight
Siltstone- as above sandstone
Shale- red browns to violets and greys, earthy to subearthy, firm to very firm, occasionally slightly calcic, often silty

4406-4440

Interbedded:
Limestone- light grey to white, microbiosparmicritic to cryptosparmicritic, soft and shaley to moderately firm, argillaceous, trace organic trash, possible trace asphaltic residual stain
Sandstone/Siltstone- grey to light grey, very fine to trace fine, rounded slightly frosted, quartz grains in a mixed silica/non-calcic clay, matrix; tight, no stain
Shale- grey to light grey, subwaxy to earthy, subblocky, soft to firm, slightly to moderately firm, silty, trace very fine sandstone grains
Chert- light grey to blue white, translucent, hard

4440-4452

Limestone- light grey to white to trace buff grey, microcrystalline to cryptocrystalline, moderately firm to firm, biomicritic to, occasionally, macritic
Sandstone- light grey to buff grey, very fine to fine rounded, slightly frosted, well sorted, quartz grains in a moderately firm to firm, calcic matrix

4452-4464

Siltstone- medium grey, firm, slightly calcic, grades into shale
Sandstone- in general, as above, slowly grading into sandstone as in the description below (4464-4486)
Shale- grey to scattered brown grey, subearthy to subwaxy, soft to firm, silty, trace sandy, to strongly calcic

4464-4486

Sandstone- buff grey to trace cream to light grey, very fine to trace slightly coarse, subangular to subrounded, moderately well sorted, moderately frosted, quartz grains in a moderately firm, to firm, and brittle, occasionally moderately calcic matrix; no stain, little effective porosity
Dolomite- buff to light grey buff, cryptomicritic, soft to moderately firm, brittle, silty (grades into siltstone), occasionally slightly calcic, tight
Shale- grey to trace purple grey to trace brown grey, subearthy to earthy, slightly firm to firm, silty and sandy in part

4486-4492

Sandstone- medium grey to trace purple grey, very fine to slightly coarse occasionally slightly frosted, moderately well to poorly sorted, quartz grains in a silica matrix. Grades into a high clay content sandy chert

4492-4510

Shale- light to medium grey to scattered red, earthy to subwaxy, subplatey, soft to firm, moderately to strongly calcic, silty (to 15%), sandy (to 3%)
Sandstone- light brown to scattered white, very fine to slightly coarse, medium sorted, moderately frosted, quartz grains in a moderately firm calcic clay cement; no stain, tight
Limestone- light grey to scattered green grey, cryptosparmicritic- grades to shale, moderately firm, silty (to 2%), to scattered sandy, no stain

4510-4540

Interbedded:
Siltstone- light grey with scattered brown, trace purple brown, moderately firm to trace very firm, moderately calcic
Chert- light grey to scattered reddish, translucent
Shale/Sandstone- as above

4540-4556

Limestone- light grey to buff grey, cryptosparmicritic, moderately firm to firm, slightly dolomitic, argillaceous, silty (to 5%), isolated very fine, rounded, quartz sandstone grains; tight
Shaley Streaks- light grey to grey to trace red brown, subwaxy to subearthy, subblocky, moderately firm to soft, silty (to 10%), scattered very fine sandstone grains (to 4%)

4556-4558

Chert- light grey to reddish brown, pink, and translucent

4558-4565

Limestone- light grey to buff grey, cryptosparmicritic, moderately firm to firm, slightly dolomitic, argillaceous, silty (to 5%), locally sandy

4565-4572

Siltstone- light grey to scattered red browns, moderately firm to firm, moderately calcic (with thin limestone streaks)

4572-4592

Limestone- light grey to buff grey, cryptosparmicritic, moderately firm to firm and britte, moderately silty (to 10%), to scattered very fine quartz grains (to 2%)

4592-4608

Limestone- light grey to grey, cryptosparitic to micromicritic, firm to trace hard, occasionally slightly dolomitic, chert matrix, silty streaks (to 15%), occasionally chalky, often argillaceous, shaley streaks, tight, no show

4608-4636

Interbedded:
Limestone- as above
Siltstone- white to light grey, firm to very firm, moderately calcic, trace sandstone grains

4636-4642

Sandstone- light grey, very fine to fine, rounded, moderately frosted, well sorted quartz grains in a moderately firm calcite clay matrix; no stain, tight

4642-4664

Siltstone- light grey to medium grey, firm to trace very firm, occasionally silicaceous, sandy, often shaley, trace chert, slightly calcic
Shale- light grey, subwaxy to earthy, subblocky to subplatey, moderately firm, silty, grades into a micrite in part

4664-4672

Interbedded:
Shale- as in 4642-4664
Sandstone- white to light grey, fine to slightly coarse, subangular quartz grains in a white, moderately firm to firm, montmorillinitic? matrix, no show

4672-4698

Sandstone- white to light grey, fine to trace slightly coarse, medium frosted to well frosted, subangular to subrounded, quartz grains in a moderately firm to firm calcitic clay matrix. Probable siltstone streaks, as well as thin silty shaley streaks

4698-4734

Shale- as the siltstone described below, platey to subplatey, subearthy, calcic, silty, pyritic, firm to moderately firm
Siltstone- light grey to buff to scattered red browns, moderately firm to firm, moderately to strongly calcic
Limestone- light brown grey, crypto to microsparitic, micritic to pure crystalline, firm to scattered very firm, occasionally argillaceous/shaley

4734-4774

Sandstone- white to light grey, slightly coarse to coarse, moderately frosted, subrounded to subangular, moderately to poorly sorted, quartz grains in a montmorillinite matrix; abundant loose grains, possible thin shale streaks (a gradual transition to below)

4774-4824

Interbedded:
Shale- red brown to tan brown, moderately firm to firm, silty, isolated sandstone grains, calcic
Chert- light brown to orange brown, translucent
Siltstone- red brown, firm to moderately firm, calcic, isolated sandstone grains

4824-4853

Mostly the first with streaks of the second:
Sandstone- white to light grey, slightly coarse to coarse, frosted, subrounded to subangular, medium well to well sorted, quartz grains; generally loose, with a moderately calcic to calcic clay matrix (when present
Silty Sandstone- in general as above, but tanner, with a tight, calcic, clay matrix (possible limestone streaks- tan grey, cryptosparitic, firm to very firm, dense

4853-4876

Shale- reds and red browns (oxidized parts), with dark grey (when reduced- clay rich, and, cherty), earthy to subearthy, moderately firm to firm (trace very firm), silty, pyritic, moderately to strongly calcic
Siltstone- in general, as the shales described immediately above, with very fine to fine subrounded to rounded, well sorted, reddish brown, quartz grained sandstone lentils
Chert- reddish brown (may be very large sandstone grains in part)

4876-4900

Sandstone- white to clear to light grey, mostly slightly coarse with scattered coarse and fine, most matrix washed out- probably moderately firm calcic clay to montmorillinitic matrix; moderately frosted, subrounded to subangular quartz grains; no stain, effective porosity unknown

4900-4944

Shale- light grey to medium grey, subwaxy to earthy, moderately firm to trace very firm, subblocky to subplatey, trace slightly calcic, pyritic in part, silty (to 12%)
Siltstone- brown grey, moderately firm to firm, grades into:
Sandstone- brown grey, fine to trace slightly coarse, slightly frosted, moderately well sorted, subrounded quartz grains in a moderately firm calcic matrix; scattered organic trash

4944-4968

Sandstone- buff grey to buff to light brown grey, fine to slightly coarse, subangular, slightly to moderately frosted, moderately well to well sorted, quartz grains in a moderately firm, dolomitic, crystalline to clay, matrix; with thin dolomitic shale streaks

4968-5004

Interbedded:

Siltstone- light grey to tan to trace buff, moderately firm, platey, sandy (to 25%), shaley

Sandstone- buff to light brown to brown grey, very fine to fine, sub-rounded to subangular, medium well sorted, slightly frosted, quartz grains in a moderately calcic, crystalline matrix

Note: A probable gradational change from near the bottom of the interval, to the "Limestone" described below)

5004-5068

Predominently:

Limestone- light brown grey to buff to light grey, cryptocrystalline to microcrystalline matrixed gastropoidal, highly fossiliferous, with a thin layer of slightly coarse quartz grains- bound by the same matrix as fossils; possible thin pelletoidal/oolitic; slowly grades into fossil hash, as well as developing organic trash

With less:

Shale- medium to trace dark grey, scattered browns and red browns, subplatey, subwaxy, moderately firm, calcic, often pyritic

5068-5090

Sandstone- light grey to grey green, fine to isolated slightly coarse, subangular, medium sorted, slightly frosted, quartz grains in a moderately firm to firm, calcic matrix. Glauconitic, pyritic in part

Interbedded with and continuously grading into:

Limestone- light grey, cryptosparmicritic, bioclastic, pelletoidal, very sandy (quartz grains) and silty, tight

5090-5124

Interbedded

Shale- grey to light grey, subwaxy to subearthy, subplatey to subblocky, moderatly firm to firm, 35% sandstone (see below)- widely scattered fossil rich layers, moderately to strongly calcic

Sandstone- light grey to medium grey, fine to trace slightly coarse, subrounded, medium frosted, poorly sorted, quartz grains in a clay (i.e., shale as above, matrix), firm to moderately firm, scattered gauconite, moderately calcic

5124-5157

Sandstone- white to light buff, slightly coarse to coarse, subangular with angular and subrounded parts, frosted, poor to medium sorting, locally glauconitic, quartz grains, in a moderate to strongly calcic clay matrix; argillaceous, thin calcic shale streaks

5157-5198

Shale- light grey to trace buff grey (towards base), subwaxy to earthy, silty (uniformly 15-20%), sandy (as very thin vaneers on shale laminations- 10%), trace pyritic, moderately firm, moderately calcic. (Can be considered as very shaley siltstones and sandstones)

5198-5230

Limestone- light grey to white (matrix), cryptosparmacritic, oolitic, very sandy (to 30%- see below), silty (to 5%), trace glauconitic (see below)
Sandstone- light grey to white, fine to coarse (fine part approaches limestone), subangular to subrounded, frosted, medium sorted quartz grains in a moderately calcic clay cement

Note: A zone at base suggests a transition to oxidized (i.e., slow "oranging" of rocks), possibly purely geochemical

5230-5242

Transition zone to Entrada:.
Sandstone- glauconite dropping out
Shale- influx of red beds
Siltstone- as above sandstone

5242-5332

Sandstone- reddish-orange-yellow-white, very fine to coarse (function of bedding), subrounded to scattered rounded, moderately frosted quartz grains. 95% free grains, sorting indeterminate, moderately calcic weak cement (when present), no show

5332-5346

Interbedded:

Shale- orange to scattered red brown, scattered light grey green, subearthy, subblocky to subplatey, slightly strongly calcic, very silty, sandy (grades into sandstone as well as siltstone)

Sandstone- clear (loose grains- cavings in part) to ora : brown, subangular to subrounded, moderately frosted, medium to well sorted quartz grains in a moderately firm, moderately calcic matrix; silty (to 15%), shaley

5346-5390

Interbedded:

Sandstone- orange brown to brown, very fine to medium sized (grains), frosted, medium to well sorted, quartz grains in a slightly to moderately calcic clay (slightly hematitic) matrix; silty, shaley

Siltstone- in general as sandstone described above

Shale- orange browns to oranges, earthy to subearthy, blocky to subplatey, moderately firm to firm, to moderately calcic, very silty, sandy in part, possibly pyritic

5390-5430

Interbedded:

Dolomite- light grey to buff grey, microcrystalline to cryptocrystalline, firm to moderately firm, slightly calcic, silty (grades into siltstone), relic bioclastic textures

Siltstone- light grey (perhaps red oranges at top), moderately firm to firm, slightly calcic, grades into the dolomite described above

Sandstone- in general as above siltstone, with fine to very fine quartz grains

5430-5470

Transition Zone:

Shale- red to red brown with yellow, earthy to subearthy, subblocky to subplatey, moderately firm to firm, silty, slightly to moderately calcic

Siltstone- as above shale, plus scattered very fine rounded quartz grains, moderately firm, slightly to moderately calcic

With Scattered

Sandstone- in general as above siltstone, plus predominantly medium sorted, very fine to fine, rounded quartz grains

5470-5506

Influx:

Sandstone- light reddish brown to tan, medium to moderately well sorted, frosted, quartz grains in a moderately firm to firm and brittle clay (often montmorillinite) matrix, no show

5506-5570

Sandstone- as in description immediately above, and: smaller grain sized and more of a shaley (red) matrix
Siltstone- reddish browns, moderately firm, abundant very fine rounded quartz grains

5570-5682

Copius:
Sandstone- light orange to light red brown, fine to medium- with scattered slightly coarse, slightly to moderately frosted, subrounded to scattered rounded, medium to well sorted, quartz grains in a moderately firm, and, brittle, crystalline/clay matrix. Generally non-calcic

5682-5720

Copius:
Sandstone- light orange brown to scattered orange, very fine to medium grained, generally well sorted, subrounded- with subangular towards top, frosted, quartz sands in a moderately firm, slightly calcic crystalline to clay matrix. About 3-5% orange brown shale- both silty and sandy, that is non-calcic

5720-5880

Sandstone- light orange brown to orange to clear, loose grains, fine to medium to scattered coarse, slightly to strongly frosted, medium to well sorted, quartz sands, in a slightly to moderately firm, generally clay matrix; occasional trace organic trash
(Possible trace of unoxidized sands)

5880-6120 (Penetration rate variation proportional to changes in weight)

Sandstone- light orange to orange, fine to slightly coarse, medium to well sorted, slightly to strontly frosted, subangular to subrounded, quartz grains in a slightly firm, to firm and brittle clay, to occasionally crystalline matrix; occasionally fine grained, silty, and higher clay "contented"
(Grades into thin bedded siltstone and shales)

6120-6152

Predominantly the first:
Sandstone- orange to orange brown, fine to slightly coarse, subangular (with angular and subrounded parts), moderately

frosted, medium sorted, quartz grains in a crystalline to clay, occasionally slightly calcic matrix

With thin beds of

Shale- white to buff grey, waxy, gooey, slightly to moderately firm, non-calcic, organic trash (most on montmorillinite)

6152-6198

Predominantly the first:

Sandstone- in general, as above, with 1) smaller grain sizes, and 2) slightly less oxidized with widely scattered light grey tints, tight

Siltstone- as the above sandstone, but a little browner (where oxidized), and, shalier- when light grey tinted

Shale- white to light grey to scattered white, waxy to subearthy, soft to moderately firm, occasionally silty, organic trash, often montmorillinitic

6198-6248

Interbedded:

Sandstone- light tan to light brown orange with possible orangey component, very fine to slightly coarse, subangular to subrounded, medium sorting, moderately to strongly frosted quartz grains in a moderately firm to firm- mostly montmorillinitic- cement, very silty

Shale- buff to light grey, waxy to subearthy, platey to subplatey, moderately firm to soft, often gooey, non-calcic, organic trash

Siltstone- tan to light brown orange, moderately firm to firm and brittle, very sandy

6248-6293

Interbedded:

Shale- brick red to reddish browns, blocky to subblocky, subwaxy to earthy, firm to moderately firm, often very silty, non-calcic

Siltstone- light reddish brown with scattered buffs, firm, non-calcic, shaley, locally sandy

With Streaks:

Sandstone- light red browns to scattered reddish buffs, very fine to fine, rounded to subrounded, frosted, medium sorted, quartz grains in a very tight clay cement. Possible traces of in situ hematite cementation. Shaley, silty

6293-6348

Interbedded:

Sandstone- light to dark reddish brown, very fine to fine to scattered slightly coarse, medium sorted, quartz grains in a moderately firm to firm 60% montmorillinite and 40% hematite matrix; grades through siltstone, very shaley (though not argillaceous)

Siltstone- as above sandstone. but with a higher hematite clay component

Shale- red brown with scattered buff, subblocky to subplatey, earthy (when brownish) to waxy (when buff), silty, often sandy

6346-6382

Influx:

Shale- yellow ochre to yellow brown, waxy to subwaxy, moderately firm to firm, slightly calcic, scattered anhydrite filled fossil molds, often silty

Siltstone- yellow brown, moderately firm, shaley, isolated very fine sandstone grains

Sandstone- yellow brown to light brown red, very fine to fine rounded to subrounded quartz grains in a tight shale matrix; well sorted

6382-6387

Sandstone- yellow to yellow brown to scattered yellow green, very fine to fine to trace slightly coarse, rounded, medium well sorted, quartz grains in a dolomitic clay, and/or, occasionally cryptocrystalline matrix; mostly, very firm; Limonitic in part. Silty

6387-6404

Interbedded:

Shale- light green brown yellow, earthy to subearthy, blocky to subplatey, moderately firm to firm, silty and sandy, limonitic, occasionally hematitic

Sandstone- light brown to trace green brown, very fine to fine, rounded, quartz grains in a moderately firm limonitic to hematitic, firm matrix; tight

6404-6456

Interbedded

Sandstone (20%)- tan to light brown to light grey, scattered

coarse to very coarse loose grains, very fine to fine cemented, well sorted, frosted quartz grains in a moderately firm, occasionally calcic matrix; often silty; when less oxidized- matrix is more calcic, otherwise, moderately calcic

Siltstone (10%)- as above

Shale (70%)- light grey to buff to light green to yellow to brown, earthy to subwaxy, blocky to platey, moderately firm to firm; a series of oxidized/reduced beds with fossils in reduced parts, various iron sulfide minerals; towards base, becomes both carbon and chert disseminated

6456-6487

Interbedded:

Shale- as above with: less organic trash, less oxidized component

Sandstone- light tan grey to yellow, very fine to fine to isolated coarse, well to medium well sorted, moderately frosted quartz grains in a crystalline/clay, moderately dolomitic to occasionally anhydritic, occasionally montmorillinitic matrix

Siltstone- as sandstone above

6487-6509

Influx:

Sandstone- light tan grey to white to yellow, often translucent; fine to coarse (loose) grains, slight frosted, medium sorted, quartz grains in a soft/slightly firm, non-calic crystalline matrix; abundant montmorillinite streaks (which have abundant black residual stain and/or carbon debris, may be slightly shaley

6509-6520

Shale- brown to tan to buff with scattered unoxidized greys, blocky to subplatey, subearthy to earthy, moderately firm to scattered very firm, hematitic to slightly limonitic; scattered asphaltic stain along thin non-oxidized partings; locally micaceous, locally sandy

6520-6534 SEE SHINARUMP SHOW REPORT

6534-6547

Sandstone- in general as in show, but, 1) less yellow and more tan, 2) far less porous (more unspecified clays as well as montmorillinite), 3) progressively smaller- to fine grain sizes, and 4) thin tan to white partings with black residual stain. Scattered miscellanceous chalky stain

And:

Shale- brown red to scattered buff to light brown and white, earthy to subearthy, blocky to subplatey, slightly calcic, silty, sandy, possible chert filled mud cracks or as fill around sandstone lentils

6547-6576

Interbedded

Shale- red brown to brown to orange to red greys with probable "grey" zones with abundant organic trash towards the top of interval; earthy to subearthy, subblocky to subplatey, moderately firm to firm to trace very firm, silty (to 30%), pyritic, sandy (mostly very fine- to 5%)

6576-6616

Shale- orange to orange brown to brown with 5% scattered greys, waxy to earthy, blocky to subplatey, soft to isolated very firm, silty (to 20%), pyritic, scattered organic material in more reduced parts

Siltstone- as above shale (with less organic material)

Chert- white, orange, translucent

6616-6650

Shale- orange to orange brown (oxidized) to greys with brown tints, blocky to subplatey, soft to trace very firm, slightly to trace moderately calcic, silty (to 20%), pyritic, abundant organic material in more reduced parts; scattered white to orange, very clay filled, very fine, silty, rounded, quartz sandstone lentils; locally anhydritic

6650-6728

Repeating cycles of:

Shale- orange brown to orange to brown with isolated grey tints, subearthy, blocky to subplatey, alternately silty/sandy and less so; pyritic, locally anhydritic clasts, and, possibly, anhydrite mud crack fill

6728-6803

Siltstone- orange brown to orange to scattered buff and brown- with thin (to 5%) unoxidized grey (and often more calcic) light grey streaks

6803-6830

Sandstone- interbedded whites (10% of sample) to light red grey (15% of sample) to preponderently buff (75% of sample), very fine to slightly coarse, medium to highly frosted, well sorted, subangular to subrounded, quartz grains, in a moderately firm to firm, moderately calic-dolomitic (when light or light grey) to slightly calcic (when possessing a hematitic clay matrix), pyritic; trace residual black intergranular stain, very tight matrix

Siltstone- orange brown to orange- with scattered grey streaks, firm to soft, slightly calcic, sandy (to 5% up to slightly coarse quartz grains), pyritic, micaceous, probably unoxidized streaks in association with sandstone above

Shale- orange to orange brown, earthy to subearthy, subblocky to subplatey, slightly calcic, silty, sandy (to 10% mostly fine to very fine with scattered slightly coarse), probable thin reduced (grey) streaks, pyritic, micaceous in part

6830-6838

Siltstone/Shale- as above, with no unoxidized streaks

Chert- buff to light grey to white, opaque, relic pelmicritic textures

6838-6862

Dolomite/Sand (more of a sand at the top and base)- light buff grey to tan to light brown, cryptocrystalline to scattered microcrystalline dolomite that is 1) a matrix for fine to medium, well sorted, frosted, quartz sandstones, and 2) as thin to moderately massive beds that are often interbedded with precipitated cherts; scattered tightly bound live oil microvugs, and, very abundant brown dead oil stain. Stain and live oil filled microvugs often lie in layers, suggesting that "it" is syngenetic with deposition. Bright mineral and oil flourescence, strong yellow streaming cut, little significant porosity, stain drops out near top

6862-6906

Interbedded:

Shale- red to red brown to orange, earthy to subearthy, subblocky to subplatey, moderately firm to scattered very firm, micaceous, silty (to 40%)

Siltstone- buff to red browns with scattered light greys, moderately firm to scattered very firm, to trace moderately calcic, sandy (15%- scattered very fine to fine grained sandstone lentils), scattered pyrite, muscovite and biotites; shale laminations, no fluorescence, scattered yellow streaming cuts from residual oil platelets

6906-6932

Interbedded:

Siltstones- light greys, buffs, red browns, firm to very firm, to slightly calcic, sandy (to 10%), scattered pyrite, less muscovite than above, occasionally biotitic; clay streaks, abundant matrix clays

Shale- as above

6932-6946

Shale- dark to medium red brown- with possible thin scattered light greys, earthy to subearthy, moderately firm trace very firm, silty (to 20%), trace sandy (to 3%), micaceous, possible carbon/organic trash when no oxidized (probably cavings in part)

Siltstone- as above

6946-6970

Interbedded:

Shale- light to dark red browns with 5% whites to light greys. The whites to light greys are: soft to moderately firm, subplatey, calcic, with black residual staining along laminations, to 15% silty. The red browns are as the shale described in the previous (uphole) description

6970-7002

Shale- as above + less of the light grey to white limey component

And less:

Siltstone- as above

7002-7045

Interbedded

Shale- light to dark red browns, moderately firm to very firm, earthy to subearthy, silty, sandy (to 5% fine rounded quartz grains) To slightly calcic, scattered micas, trace pyrite

Siltstone- ½ grading from shale above, and, ½ a light grey. The light grey part: moderately firm to very firm, non-calcic, intergranular black residual stain

7045-7136

Interbedded:

Siltstone- grey to light grey to red grey with scattered orange to red browns: 50-20% grey siltstone- firm to very firm, moderately dolomitic, locally sandy (to 5%), pyritic, trace pinpoint residual stain. The oxidized parts are similar to the shale described below

Shale- light to dark grey (reduced and in association with the grey siltstones described above- platey to subplatey, subwaxy to subearthy, moderately firm to firm, less silty than oxidized parts) to orange browns to oranges (20-30% of sample- blocky to subblocky, slightly to moderately calcic, very silty, sandy ((to 15%)), scattered pyrite)

7136-7152

Siltstone- as greyer part of siltstone described above, with scattered light grey to white, thin bedded, platey shales. Abundant organic trash in the shales

7152-7174

Interbedded:

Siltstone- medium to light grey (reduced) to red orange brown (oxidized), shaley (particularly in oxidized part), occasionally sandy (10%- to fine rounded quartz), pyritic, micaceous, dolomitic matrix (grades into dolomitic shale), with isolated pure dolomite streaks

Shale- mostly red brown to orange brown to orange to scattered light grey, waxy to earthy and silty, micaceous in more reduced parts

7174-7185 (accented in part, due to variations in drilling parameters)

Siltstone (80%)- red brown to orange brown to orange to trace light grey, earthy to subearthy, soft and in suspension to very firm, to slightly calcic, less sandy than above (to 5%), very shaley, scattered disseminated pyrite

Shale (20%)- as in previous uphole description + less light grey and less of a silty component

7185-7234

Shale- light to dark red brown, platey to subplatey, waxy to subwaxy, soft to scattered very firm, to slightly calcic, less silty, isolated slightly coarse to coarse rounded quartz grains, pyritic (particulary in silty parts)
Grading into:
Siltstone- mostly light to dark red brown, moderately firm to isolated very firm, to slightly calcic, shaley, scattered pyrite

7234-7244

Dolomite- very light grey to grey buff, cryptocrystalline to scattered microcrystalline, moderately firm to firm, locally sandy (isolated grains to .5%), scattered silty (to 5%), scattered disseminated pyrite, chalky with widely scattered black residual chalky stain, mineral fluorescence, scattered chalky stain

7244-7253

Siltstone- light grey to white to trace brown grey, dolomitic to slightly calcic, very shaley in part, scattered disseminated pyrite
Shale- light grey to white (and calcic) to locally oxidized, dolomitic, silty, and sandy

7253-7265

Interbedded:
Shale- red to red brown, earthy to subwaxy, subplatey to subblocky, firm to very firm, moderately silty (to 10%), slightly to trace moderately calcic
Siltstone- tan to buff, moderately firm, slightly calcic

7265-7280

Dolomite- buff to cream to scattered grey tan, cryptocrystalline to microcrystalline, moderately firm to firm, slightly calcic
Interbedded with:
Siltstone- buff tan, moderately firm to trace very firm (cavings in part), to slightly calcic
And scattered:
Shale- as in 7253-7265 description

7280-7299

Shale- red browns to scattered miscellaneous oxicolors, moderately firm to scattered hard, waxy to subearthy, subplatey to subearthy, slightly to moderately calcic, silty component decreasing, dolomite clasts and as possible fracture fill, with widely scattered dolomites as in the above dolomite description

7299-7310

Dolomite- cream buff to trace light grey, cryptocrystalline to microcrystalline, slightly firm to very firm, slightly calcic, chalky, shaley, to very firm and dense (possible disseminated chert), slightly silty in part, chalky stain, strong mineral fluorescence (associated with chalky stain), chalky cuts

7310-7350

After a streak of:
Shale- red brown, earthy to subearthy, to slightly calcic
Interbedded:
Dolomite- tan cream to tan, cryptocrystalline to scattered microsucrosic, firm to very firm, massive towards base of interval, to slightly calcic, strong crystalline intergrowth, no significant stain, no mineral fluorescence, tight
Dolomite- light cream to white to cream grey, cryptocrystalline to microcrystalline, moderately firm to scattered firm, slightly to strongly chalky, very abundant black chalky stain- both as microdots and as laminations. Far less pyritic than above. Moderately calcic in part

7350-7360

Dolomite- buff tan, cryptocrystalline matrix to microcrystalline to trace microsucrosic, moderately firm to firm, moderately to trace strongly calcic, scattered relic bioclastic textures; anhydrite filled vugs- also as loose cuttings; cherty at top, scattered thin fine to slightly coarse subrounded, frosted, medium sorted quartz grains in a more calcic matrix; scattered residual chalky stain, as well as a trace of live oil in association with chalky component, very bright mineral fluorescence

7360-7370

Interbedded:

Sandstone- light to medium grey to scattered white, very fine to scattered fine, medium to medium well sorting, with a firm to very firm moderately to strongly calcic matrix, moderately to slightly frosted quartz grained, scattered flakey brown live oil stain, weak fluorescence, poor to fair yellow cuts from the live oil stain and from scattered very dark brown chalky residual stain

Limestone- tan to buff to cream, cryptocrystalline to microcrystalline, cryptosparmicritic, often as a matrix for thin very fine to fine rounded quartz grained sandstone lentils, firm to trace very firm, occasionally silty, scattered weak yellow fluorescence, trace possible live oil stain, slight to moderate cloud cuts from the trace possible live oil as well as from isolated dead oil stain. Appears to be finely bedded, isolated pyrite

7370-7387

Interbedded:

Sandstone- as above, but shalier, with far more abundant organic trash towards base. Closer to a limestone than sandstone as above. Finely bedded, slight fluorescence, with scattered dark brown residual stain, as well as isolated pinpoint and flaky brown live oil stain (.25% of sample), selective fair yellow to yellow green cloud cuts

Limestone- tan to tan grey to cream, cryptosparmicrites to macrites, abundant pellets (to 1 mm)- most often in the lighter components, weak bioclastic textures, possibly locally algal, abundant thin silty to very fine rounded quartz sandstone lentils (to 3%), scattered pinpoint and flake live oil, scattered chalky stain, all in a firm to very firm, occasionally dolomitic matrix, organic trash

7387-7419 SEE CORE DESCRIPTION SECTION

7419-7435 (Very Poor Sample: Lithology Estimated)

Sandstone- clear to white to light grey, medium to fine, medium sorted, subangular to subrounded, slightly to moderately frosted, quartz grains, in a moderately to strongly calcic clay to crystalline cement (cement grading into white clay streaks), very isolated residual black stain, some mineral fluorescence

7435-7455 (7450-7460 is the first interpretable sample)

Sandstone- white to clear to trace buff, slightly coarse to coarse, subrounded to subangular, medium sorted, slightly to moderately frosted, quartz grains in a largely dolomitic cyrstalline matrix, probable intergranular chert in part, firm to very firm (pieces are small suggesting explosive shearing while being drilled), very isolated traces of black residual stain. Abundant montmorillinite

The tighter parts are both smaller grained and chalkier.

7455-7488

Sandstone- white to clear to trace buff grey, very fine to fine to coarse, medium to medium poorly sorted, subrounded to subangular, quartz grains in a dolomitic/silicaceous cement. Abundant montmorillinite clay streaks, trace thin platey vericolored oxidized shales, scattered chalky stain, trace of black to dark brown intergranular residual stain.

7488-7520

Sandstone- as above with slightly smaller over all grain sizes, perhaps a small increase in chalky stain.

020902

Dtl.
43-047-31825 5S 21E Sec. 1

AXEM RESOURCES, INC.

#16-1 Vernal Well
Uintah County, Utah

TTCS File No. 88075

CORE NO.	INTERVAL	FORMATION
1	7387.0-7393.0	Lower Phosphoria
2	7393.0-7395.0	Weber
3	7395.0-7409.0	Weber
4	7409.0-7419.0	Weber

January 29, 1988

Axem Resources, Inc.
7800 E. Union Avenue
Suite 1100
Denver, Colorado 80237

ATTN: Mr. Jim Peterson

SUBJECT: Routine Core Analysis; #16-1 Vernal Well;
Uintah County, Utah; TTCS File No. 88075

Gentlemen:

Diamond coring equipment and water base mud were used to obtain 4.0-inch diameter cores from the formations and intervals shown on the preceding page in the subject well. A representative of Terra Tek Core Services received the cores at the wellsite where the interval from 7400.6 to 7407.0 feet was preserved with saran film and, along with all of the recovered core, was transported to our Salt Lake City laboratory for routine retort analysis. Per your instructions, no other core intervals were preserved.

A core gamma log was recorded and, along with porosity, permeability, grain density and fluid saturation plots, is shown on the enclosed Teklog.

Residual fluid removal was accomplished by the controlled temperature retort extraction method on 100-gram crushed samples selected from those core intervals as specified by you. Porosities were determined on 1.0-inch diameter plug samples by Boyle's law (helium) grain volumes and Archimedes (mercury) bulk volumes. Horizontal permeabilities to nitrogen were measured on these same plugs in a Hassler sleeve using an orifice-equipped pressure transducer to monitor downstream flow.

Data resulting from the above analysis are tabulated on pages one and two, followed by a summary reflecting average data by zones based on permeability, porosity and fluid saturation variations. Note that the measured low residual water saturations in zone #5 (7409-7418 feet; samples #12-#16) reflect the unpreserved conditions of this core interval.

The cores are scheduled to be slabbed, 1/3-2/3, soon. We are also awaiting your specific instructions on the following:

1 - Petrographic work
2 - Potential core photography
3 - Shipping addresses for core slabs and butts

We sincerely appreciate this opportunity to be of service.

Very truly yours,

Jack R. Good

Jack R. Good
Laboratory Director

JRG/jl

FINAL DISTRIBUTION LIST

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#16-1 Vernal Well
Uintah County, Utah

TTCS File No. 88075

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Casper, WY 82601

ATTN: Neal Leafdale

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United Founders Tower #1500
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Oklahoma City, OK 73112

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Division of Oil, Gas & Mining
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

AMOCO PRODUCTION COMPANY
P.O. Box 800
Denver, CO 80201

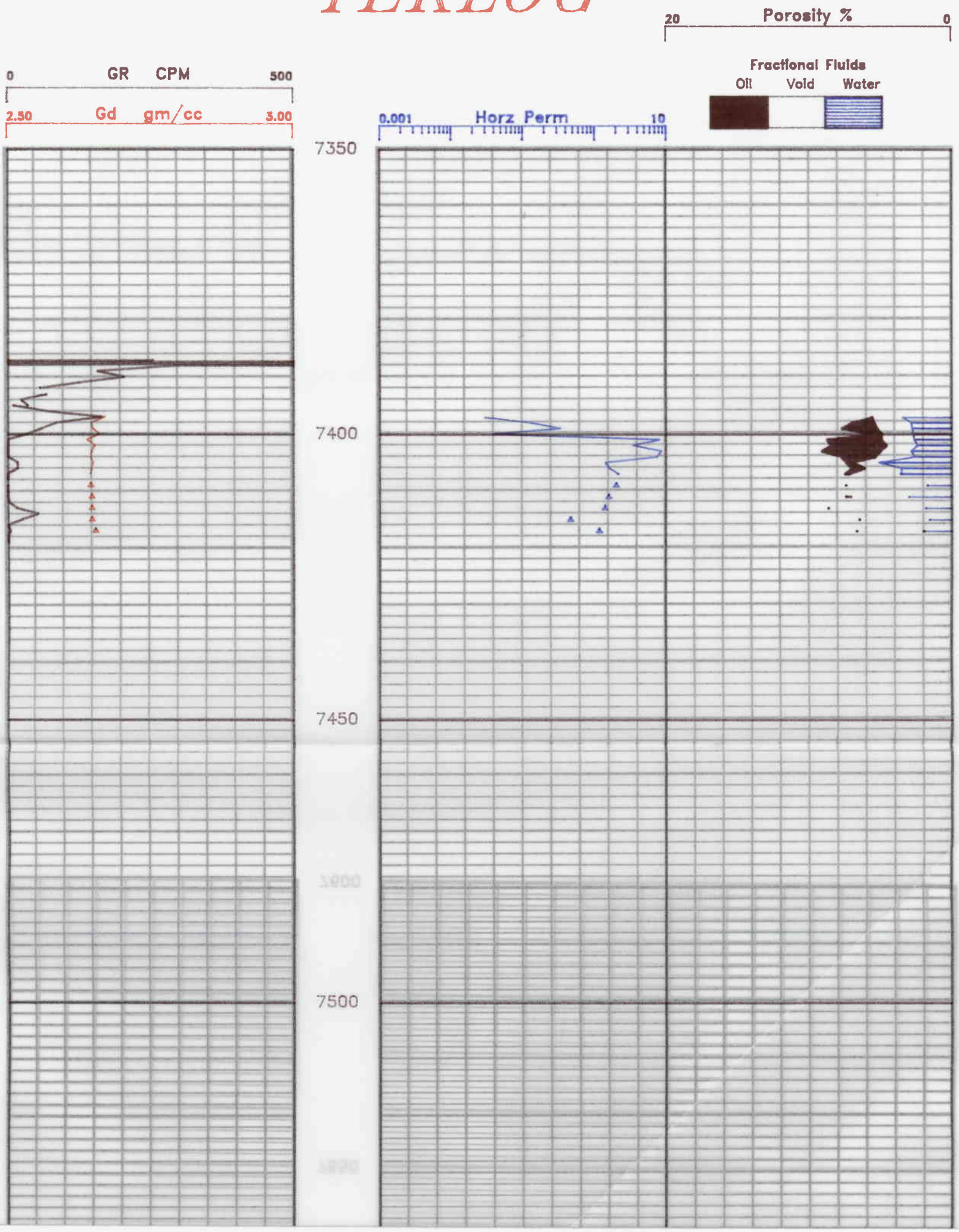
ATTN: Mr. Tom Dill

TERRA TEK CORE SERVICES
360 Wakara Way, SLC Utah 84108 (801) 584-2480

AXEM RESOURCES, INC.
#16-1 Vernal

TEKLOG

Jan. 29, 1988
TTCS# 88075



TerraTek Core Services, Inc.®

University Research Park - 360 Wakara Way - Salt Lake City, Utah 84108 - (801) 584-2480 - TWX 910-925-5284

AXEM RESOURCES, INC.

Well:	#16-1 Vernal	State:	Utah	Date:	29-JAN-1988
Field:	Wildcat	County:	Uintah	TTCS File #:	88075
Drilling fluid:	LSND	Location:	Sec. 1-T5S-R21E	Elevation:	5290 KB

RETORT ANALYSIS - BOYLE'S LAW POROSITY

Sample Number	Depth (feet)	Permeability Horz (md)	Permeability Vert (md)	Porosity %	Saturation Oil %	Saturation H2O %	Grain Density (gm/cc)	Lithology
	7387.0-91.0							Ls,dol stks
	7391.0-92.3							Sd,lmy
	7392.3-93.0							Not Recovered
	7393.0-97.0							Sd,lmy
Weber Formation								
1	7397.0-98.0	.03		5.6	0.0	62.2	2.67	Sd,vf-fg,slty,sl/pyr
2	7398.0-99.0	.13		7.0	22.8	40.7	2.65	Sd,vf-fg,slty
3	7399.0-00.0	.33		7.7	32.1	36.1	2.65	Sd,vf-fg,slty
4	7400.0-01.0	.04		5.5	10.9	49.3	2.66	Sd,vf-fg,slty,sl/pyr
5	7401.0-02.0	8.1		8.7	43.6	30.2	2.64	Sd,vf-fg
6	7402.0-03.0	3.4		8.5	46.5	28.6	2.65	Sd,vf-fg,sl/pyr
7	7403.0-04.0	8.5		9.1	45.3	31.4	2.65	Sd,vf-fg,sl/pyr
8	7404.0-05.0	7.4		7.7	31.1	33.7	2.65	Sd,vf-fg
9	7405.0-06.0	1.4		7.4	6.6	69.2	2.65	Sd,vf-fg
10	7406.0-07.0	1.6		7.0	13.1	50.5	2.65	Sd,vf-fg
11	7407.0-08.0	2.1		7.5	4.5	48.4	2.65	Sd,vf-fg
	7408.0-09.0							Not Recovered
12	7409.0-10.0	2.0		7.4	0.0	23.7	2.65	Sd,vf-fg
	7410.0-11.0							Sd,A/A
13	7411.0-12.0	1.6		7.4	4.9	41.0	2.65	Sd,vf-fg
	7412.0-13.0							Sd,A/A

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AXEM RESOURCES, INC.
Well: #16-1 Vernal

Date: 29-JAN-1988

TTCS File #: 88075

RETORT ANALYSIS - BOYLE'S LAW POROSITY

Sample Number	Depth (feet)	Permeability Horz (md)	Permeability Vert (md)	Porosity %	Saturation Oil %	Saturation H2O %	Grain Density (gm/cc)	Lithology
14	7413.0-14.0	1.4		8.6	0.0	21.7	2.65	Sd,vf-fg
	7414.0-15.0							Sd,A/A
15	7415.0-16.0	.46		6.4	0.0	24.9	2.65	Sd,vf-fg
	7416.0-17.0							Sd,A/A
16	7417.0-18.0	1.2		6.7	0.0	29.7	2.65	Sd,vf-fg
	7418.0-19.0							Sd,A/A

KEY TO LITHOLOGICAL ABBREVIATIONS

Ark - Arkosic
Anhy - Anhydrite/anhydritic
Gyp - Gypsum
Sd - Sand/Sandstone
sdy - sandy
Ls - Limestone
lmy - limy
Dol - Dolomite/Dolomitic
Ms - Mudstone
Sltst- Siltstone
slty - silty
Sh - Shale
shy - shaley
Cht - Chert
Bent - Bentonite
chty - cherty
chky - chalky
arg - argillaceous
Lig - Lignite/lignitic

carb - carbonaceous
Pyr - Pyrite/pyritic
Cgl - conglomerate/ conglomeratic
Cly - Clay/clayey
Tuff - Tuff
Ign - Igneous
calc - calcareous
ool - Oolitic
pis - pisolites/pisolitic
Sid - Siderite
fis - fissures
frac - fractures
fos - fossiliferous
sty - stylolite
pel - peloids
suc - sucrosic
stk - streak(s)

nod - nodules
lam - laminations
incl - inclusions
pp - pinpoint
vgs - vugs
vgy - vuggy
glauc- glauconitic
v/ - very
sl/ - slightly
sil - siliceous
g - grain
xl - crystalline
vf - very fine
f - fine
m - medium
c - coarse
vc - very coarse
VF - vertical fracture

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AXEM RESOURCES, INC.

Well:	#16-1 Vernal	State:	Utah	Date:	29-JAN-1988
Field:	Wildcat	County:	Uintah	TTCS File #:	88075
Drilling fluid:	LSND	Location:	Sec. 1-T5S-R21E	Elevation:	5290 KB

RETORT ANALYSIS - BOYLE'S LAW POROSITY
DATA SUMMARY

Zone Number	Depth Interval (feet)	Number of Samples	Permeability Horz (md)	Permeability Horz-90 (md)	Permeability Vert (md)	Porosity %	Saturation Oil %	Saturation H2O %	Grain Density (gm/cc)
Weber Formation									
1	7397.0-98.0	1	.03			5.6	0.0	62.2	2.67
			[0.000]			[0.00]	[0.00]	[0.00]	[0.00]
2	7398.0-01.0	3	.17			6.7	21.9	42.0	2.65
			[0.151]			[1.14]	[10.6]	[6.67]	[0.00]
3	7401.0-05.0	4	6.8			8.5	41.6	31.0	2.65
			[2.328]			[0.57]	[7.09]	[2.16]	[0.00]
4	7405.0-08.0	3	1.7			7.3	8.1	56.0	2.65
			[0.387]			[0.25]	[4.44]	[11.4]	[0.00]
5	7409.0-18.0	5	1.3			7.3	0.0	28.2	2.65
			[0.561]			[0.86]	[0.00]	[7.75]	[0.00]

[] Sample Standard Deviation

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HORIZONTAL PERMEABILITY VS POROSITY

AXEM RESOURCES, INC.
#16-1 Vernal
Wildcat
Uintah Co., Utah
Jan. 29, 1988

Depth Interval: 7397 to 7417 feet
TTCS# 88075

Porosity (phi),

Min	Max	Average
5.488	9.106	7.400

Permeability (Kh), mD

Min	Max	Geo. Ave
0.030	8.500	0.994

Equation of the Line

log Kh = α phi + β

log Kh = 0.5955 phi −4.4094

Correlation Coefficient : 0.823

Weber Formation